This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Med 1760.61

Harvard College Library

FROM

Transferred from
Social Ethics Library

FOURTH ANNUAL REPORT

OF THE

HENRY PHIPPS INSTITUTE

FOR THE STUDY, TREATMENT, AND
PREVENTION OF TUBERCULOSIS

February 1, 1906, to February 1, 1907

FOURTH ANNUAL REPORT

OF THE

HENRY PHIPPS INSTITUTE

FOR THE STUDY, TREATMENT, AND PREVENTION OF TUBERCULOSIS

February 1, 1906, to February 1, 1907

AN ACCOUNT OF THE GENERAL AND SPECIAL CLINICAL AND PATHOLOGICAL WORK DONE BY MEMBERS OF THE STAFF AT THE INSTITUTE DURING THE YEAR

EDITED BY JOSEPH WALSH, A.M., M.D.

PUBLISHED BY THE
HENRY PHIPPS INSTITUTE
238 PINE STREET, PHILADELPHIA
1908

Med 1160.61

SEP 24 1915

Transferred to
Cooper Library

NOV 17 1916

CONTENTS OF THE FOURTH ANNUAL REPORT.

PAGE

Medical Staff of the Institute,..... 4

Clinical and Sociological Report of the Year,..... 5
LAWRENCE F. FLICK.

A Study of the Blood in Pulmonary Tuberculosis,.....108
FRANK A. CRAIG.

Albuminuria and Casts in Pulmonary Tuberculosis,.....120
C. M. MONTGOMERY.

Laryngological Report of the Year,.....158
HENRY J. OFF.

The Importance of the Upper Respiratory Tract in the Etiology of Cryptogenetic Infections, especially in Relation to Pleuritis, ...163
GEORGE BACON WOOD.

Tuberculosis of the Bones and Joints,.....203
WM. W. CADBURY.

Tuberculosis of the Lymphatic Glands and Skin,.....224
J. DOUGLAS BLACKWOOD.

Neurological Report of the Year,.....238
D. J. MCCARTHY.

The Pleura in Pulmonary Tuberculosis,.....265
W. B. STANTON.

Comparison of the Pathological Findings with the Recorded Clinical Signs in Nine Cases of Tuberculosis of the Lungs,.....290
JOSEPH WALSH.

Pathological Report of the Year,.....316
C. Y. WHITE.

Bacteriological Report of the Year,.....378
J. W. IRWIN.

The Relation of the Pneumococcus to Hemorrhage in Tuberculosis,.....390
JOSEPH WALSH.

Comparison of Results at White Haven Sanatorium and Phipps Institute,..396
JOSEPH WALSH.

Training School for Nurses of the Henry Phipps Institute,.....403
GEORGE BACON WOOD.

Special Index of Cases Mentioned in the Report, ...405

Index,.....415

MEDICAL STAFF OF THE INSTITUTE DURING THE FOURTH YEAR.

Medical Director,

LAWRENCE F. FLICK, M.D.

Assistant Medical Director and Bacteriologist,

MAZŸCK P. RAVENEL, M.D.

Physicians,

JOSEPH WALSH, M.D.
CHARLES J. HATFIELD, M.D.
J. W. IRWIN, M.D.
WARD BRINTON, M.D.
GEORGE W. NORRIS, M.D.
FRANK A. CRAIG, M.D.
H. R. M. LANDIS, M.D.
W. B. STANTON, M.D.
HORACE CARNCROSS, M.D.
JOSEPHUS T. ULLOM, M.D.
W. B. FETTERMAN, M.D.
W. TAYLOR CUMMINS, M.D.
JOHN M. CRUICE, M.D.
ALBERT P. FRANCINE, M.D.
SAMUEL RHOADS, M.D.
IRVIN E. BENNET, M.D.
C. M. MONTGOMERY, M.D.
SAMUEL McCLARY III, M.D.
DANIEL M. HOYT, M.D.
CHARLES B. WORDEN, M.D.
WM. W. CADBURY, M.D.
A. J. COHEN, M.D.
E. C. BENDER, M.D.
J. CLINTON FOLTZ, M.D.
E. J. G. BEARDSLEY, M.D.
J. DOUGLAS BLACKWOOD, JR., M.D.

Laryngologists,

W. G. B. HARLAND, M.D.
GEORGE B. WOOD, M.D.
GEORGE FETTEROLF, M.D.
HENRY J. OFF, M.D.
GEORGE M. COATES, M.D.

Dermatologist,

J. FRANK WALLIS, M.D.

Pathologist,

C. Y. WHITE, M.D.

Neurologist,

D. J. McCARTHY, M.D.

Ophthalmologist,

EDWARD A. SHUMWAY, M.D.

Genito-urinary Surgeon,

HENRY TUCKER, M.D.

Honorary Fellows,

EDWARD L. TRUDEAU, M.D. EDOARDO MARAGLIANO, M.D.
L. SIMS WOODHEAD, M.A. (Cantab.), M.D. (Edin.)

CLINICAL AND SOCIOLOGICAL REPORT OF THE YEAR.

One of the functions of the Phipps Institute is to gather clinical and sociological data for scientific deductions. With this end in view every patient is subjected to searching inquiry into his personal and ancestral history and is given a careful physical examination at the time when he comes under treatment. Mode of life, occupation, associations, previous diseases, deformities and even mental attitude are studied and recorded. The physical examination includes every important organ of the body and a record is made of the healthy as well as of the unhealthy part, in order that nothing may be overlooked and that the record may show that all parts of the body have been examined.

The records of each year are bound in chronological order and preserved for reference. The annual report of the Institute is made from these records, and the scientific problems which are worked out by members of the staff and reported in the annual report are, as a rule, based upon the data contained in these records. The Institute now has records of nearly five thousand cases. All of these are not equally complete, inasmuch as in the beginning many difficulties were encountered which go with a new work and which materially interfere with accuracy of observation and complete records; moreover, the men who are now doing the work with great accuracy had to be trained for it, the records improving just as these men have become more expert in their work.

Even with the best trained staff there is ample opportunity for error in dealing with matters of judgment based upon obser-

vation which are not of mathematical demonstration; particularly when the judgment is that of many not upon one object under exactly the same conditions, but upon many objects similar one to the other under varying conditions. While every effort is made to eliminate error as far as possible from the deductions presented, all possibilities of error should be kept in mind in valuing these deductions.

With the increase in the number of persons under observation error in deductions decreases; for this reason we give in our annual report a summary of the records published in previous years with those of the current year, as a corrective of errors which may creep into deductions drawn from a limited number of cases.

NATIVITY.

New cases, ..	Native born,.....	440	734	Admitted for treatment during the year, 1377
	Foreign born (males),.....	189		
	Foreign born (females),.....	101		
	No record,.....	4		
	Non-tuberculous or unsuitable,.....	211		
Old cases,*..	Tuberculous,.....	421	432	
	Non-tuberculous or unsuitable,.	11		
Summary for four years,	Native born,.....	2207	3733	Admitted for treatment during the four years, 4831
	Foreign born (males),.....	898		
	Foreign born (females),.....	589		
	No record,.....	39		
	Non-tuberculous, unsuitable, and undiagnosed,.....	1098		
	Duplicates,.....	8		
	Number added by correction,.....	1		
	Highest number registered,.....	4840		

	For this Year. Tuberculous.		For Four Years. Tuberculous.	
	Personal Nativity.	*Ancestral Nativity.*	*Personal Nativity.*	*Ancestral Nativity.*
Africa,.....	0	1	0	9
Austria,.....	15	20	84	96
Belgium,.....	0	0	1	1
Bohemia,.....	0	0	0	1
British Columbia,.....	0	0	1	0
British Guiana, ...	0	0	2	1

*"New cases" are those patients who came for the first time during the current year; "old cases" those who came for treatment during the current year, but had been treated in a previous year. The nativity of the tuberculous old cases is naturally therefore in the summary.

NATIVITY.—(*Continued.*)

	For this Year. Tuberculous.		For Four Years. Tuberculous.	
	Personal Nativity.	*Ancestral Nativity.*	*Personal Nativity.*	*Ancestral Nativity.*
Canada,	1	1	7	3
China,	0	0	1	1
Cuba,	2	2	4	5
Denmark,	1	1	4	5
East Indies,	0	0	1	0
England,	26	29	130	160
France,	2	2	11	14
Germany,	33	75	185	357
Greece,	0	0	1	1
Hungary,	8	8	24	24
Ireland,	49	135	333	876
Italy,	29	36	105	123
Jamaica,	0	0	1	0
Newfoundland,	1	1	6	6
Norway,	1	2	8	10
Nova Scotia,	0	1	1	3
Poland,	6	7	15	20
Portugal,	1	1	2	2
Roumania,	5	8	40	43
Russia,	102	103	451	480
Scotland,	3	4	32	38
Spain,	0	0	1	2
Sweden,	3	3	15	16
Switzerland,	1	1	6	7
Syria,	1	1	4	5
Turkey,	0	0	1	1
United States,	440	227	2211	1168
Wales,	0	1	4	4
West Indies,	0	0	4	4
Unknown,	4	3	37	42

MIXED PARENTAGE.

	For this Year. Tuberculous.	For Four Years. Tuberculous.
Canada-Ireland,	1	1
Denmark-Norway,	0	1
England-Ireland,	10	29
England-Italy,	1	1
England-Newfoundland,	0	1
England-Scotland,	0	2
England-Wales,	1	2
Germany-France,	2	3
Germany-Hungary,	1	1
Germany-Ireland,	0	3
Germany-Switzerland,	0	1
Ireland-Scotland	3	15
Ireland-Switzerland,	0	1
Ireland-Wales,	0	2
Scotland-France,	0	1
Scotland-Wales,	0	1
Spain-France,	0	1
Sweden-Mexico,	0	1

MIXED PARENTAGE.—(*Continued.*)

	For this Year. Tuberculous.	For Four Years. Tuberculous.
United-States-Canada,	2	3
United-States-Cuba,	0	1
United-States-England,	6	21
United-States-France,	0	1
United-States-Germany,	6	21
United-States-Holland,	0	2
United-States-India,	2	2
United-States-Ireland,	23	73
United-States-Norway,	0	1
United-States-Nova Scotia,	1	1
United-States-Portugal,	1	1
United-States-Roumania,	0	1
United-States-Scotland,	1	6
United-States-Wales,	0	2
United-States-West Indies,	0	2

There has been a slight increase during the year in the percentage of native born patients. During the first year 60.97% were native born, during the second 58.98%, during the third 59.39%, and during this year 60.27%. The percentage of native born, who are the children of native born, that is, native born for two generations, has decreased a trifle. It was 33.37% during the first year, 30.96% during the second year, 31.37% during the third year, and 30.92 % this year.

The foreign born patients have slightly changed their relative positions. The order, from the highest number down, among those worthy of note is Russia, Ireland, Germany, Italy, England, Austria, Hungary, Poland, and Roumania. Scotland, which in the third report stood after Austria, has fallen out of the rank of countries worthy of mention, and Hungary, Poland, and Roumania have come up enough to bring them into this category. Italy has changed places with England.

In 1900 the population of Philadelphia of foreign parentage was seven hundred and nine thousand four hundred and thirty-three, or 54.83% of the total population. Of this number, four hundred and fourteen thousand and ninety-three, or 32% of the total population, were native born whites of foreign parentage; and two hundred and ninety-five thousand three hundred and

fourteen, or 22.83% of the total population, were foreign born whites of foreign parentage. The probabilities are that the relative proportion of native born of native parentage, native born of foreign parentage, and foreign born of foreign parentage is still the same in Philadelphia as it was in 1900. It may be that there has been some increase in population of foreign parentage, but if so the increase has not been large.

The native population of Philadelphia of native parentage is approximately 45.1% of the total population; the native population of native parentage which has applied to the Institute for treatment is 30.92% of the total number of patients who have applied. Evidently the native of native parentage either has greater resistance to tuberculosis or is better able to take care of himself than the foreigner or the native of foreign parentage. Part of the discrepancy may be due to the location of the Institute in the part of the city which has the largest foreign population, but only part of it, since the Institute draws patients from all parts of the city and from outside of the city. No doubt the hardships which go with finding a foothold in a new country give the key to the explanation. The housing of the immigrant in infected houses has something to do with it.

The United States Census Report of 1900 on the death-rate from consumption gives some support to the idea that the native of native parentage of the United States is less susceptible to tuberculosis than is the native of foreign parentage or the foreigner of foreign parentage. The death-rate from consumption in the registration districts as recorded by the census was 112.8 for every one hundred thousand living natives of native parentage, while the death-rate of persons whose mothers were Irish was 339.6 per hundred thousand; of those whose mothers were German, 167 per hundred thousand; of those whose mothers were English or Welsh, 135.1 per hundred thousand; of those whose mothers were Canadian, 143.1 per hundred thousand; of those whose mothers were Scandinavian, 170.3 per hundred thousand; of

those whose mothers were Scottish, 172.5 per hundred thousand; of those whose mothers were Italian, 113.6 per hundred thousand; of those whose mothers were French, 184.7 per hundred thousand; of those whose mothers were Hungarian or Russian, 107.7 per hundred thousand; of those whose mothers were Russian and Polish, 71.8 per hundred thousand; and of those whose mothers were of some other foreign country, 153.8 per hundred thousand. In this entire list the only ones in which the death-rate was lower than that of native born Americans were the Hungarian and Russian and Russian and Polish. The figures given by the United States Census Report are based upon mortality and not upon morbidity, which in part may account for the low rate in the immigrants from some of these countries. Many of the foreign born citizens in the United States from Hungary, Poland, and Russia are Jews, and Jews undoubtedly have a very low mortality from tuberculosis even when they have a very high morbidity. Our own statistics show the high morbidity among the Jews. Many of the immigrants from Hungary and Poland, moreover, live in small towns and country districts, where the mortality from tuberculosis is lower than it is in cities.

The sociologist can find in the figures here given, supported as they are by the statistics of the United States census, an interesting picture of one side of the burden which the United States assumes in assimilating its foreign population. The picture should not be lost sight of in working out social problems, since the burden can probably be made much lighter if carried with a full comprehension of what it means in all its details.

COLOR.

New cases,	White,	660	734
	Black,	72	
	No record,	2	
Summary for four years,	White,	3470	3733
	Black,	256	
	Yellow,	1	
	No record,	6	

RACE.

New cases,	Celt,	210	734
	Teuton,	157	
	Jew,	118	
	Latin,	47	
	Slav,	30	
	Mixed,	78	
	Negro,	72	
	No record,	22	
Summary for two years,	Celt,	433	1389
	Teuton,	342	
	Jew,	228	
	Latin,	74	
	Slav,	52	
	Mixed,	133	
	Negro,	105	
	No record,	22	

No record for first two years.

The relative position of races among the patients has slightly changed during the year; there has been a decrease in Celtic, Teutonic, and Jewish races and an increase in the Latin, Slavonic, Negro, and mixed races. The greatest percentage of increase has been in the Negro, Latin, and mixed races. The Negro race has increased from 5.04% to 9.80% and the Latin from 4.12% to 6.40%. The increase in the Negro patients has not been due to an increase of tuberculosis among Negroes, but to a better disposition on the part of colored people to apply for treatment. This probably also is true of the Latin race, since most of the people of the Latin race who apply for treatment are Italians, and Italians have gradually learned more of the opportunities for treatment at the Institute.

There are in Philadelphia about seventy thousand Negroes, constituting approximately 6% of the population. The number of colored people who came for treatment during the year constituted nearly 10% of the total number of patients. This probably represents the correct ratio of tuberculous Negroes to tuberculous white people in the city. The Institute has gradually succeeded in winning their confidence more and more, and therefore gets a larger number of the poor among them for patients.

A little over 16% of the people who came for treatment during

the year were Jews. The Jewish population of Philadelphia at the present time probably is about one hundred thousand, or about 7% of the total population. This makes the relative proportion of Jews as compared with Gentiles who come for treatment very high, and stands in very strong contravention of the claim by some Jewish physicians that tuberculosis is not prevalent among the Jews. The Phipps Institute, moreover, is not the only institution in Philadelphia which is doing tuberculosis work among the Jews, as the Jewish Hospital has both a dispensary and a hospital department for the treatment of tuberculosis and does most excellent work among the Jewish poor suffering from this disease. On the other hand, it must be understood that the Phipps Institute is located in the midst of the Jewish district, and that for this reason it naturally attracts a larger percentage of the Jewish than of the Gentile tuberculous poor of the city. A side-light upon the subject of bovine tuberculosis comes out here which is worthy of note. The extreme supporters of the transmissibility of bovine tuberculosis to human beings have frequently used the orthodox Jew's freedom from tuberculosis as an argument in support of the theory that bovine tuberculosis is readily transmissible to human beings. Most of the Jews who come to the Phipps Institute for treatment are orthodox Jews and use kosher meat. So far as these people are concerned, the argument which is based upon protection against tuberculosis by the use of kosher meat must fall to the ground.

SEX.

New cases,	Male,	443	734
	Female,	291	
Summary for four years,	Male,	2177	3733
	Female,	1556	

According to our tables, during the current year 60.35% of the patients treated for tuberculosis were males and 39.64% were females. In the summary for four years 58.31% were males and 41.68% were females. Both for the current year and for the

four years the number of males treated was very much larger than the number of females, there being an excess for the four years of 16.63% males over females. These figures, moreover, do not tell the whole truth, for when the relative number of males and females who came for treatment is compared with the relative male and female population of the city, the preponderance of tuberculous males over tuberculous females is still larger. According to the United States Census Report of 1900, the male population of the city of Philadelphia constituted 49.04% of the whole population and the female population 50.95%.

The relative proportion of the sexes as indicated by the number of each sex who have applied for treatment at the Institute probably represents pretty accurately the relative prevalence of tuberculosis in the two sexes. According to the Census Report of the United States for 1900, the relative mortality from tuberculosis in registration States was 211.6 per one hundred thousand males and 164.6 per one hundred thousand females. In other words, for every hundred thousand males living in registration States 211.6 males died during that year, and for every hundred thousand females living in registration States 164.6 females died during that year. Relatively forty-seven more males for every hundred thousand male population died from tuberculosis during the year than did females for every hundred thousand females living.

Why tuberculosis is more prevalent in the male than in the female has not been definitely determined, but in all probability the greater hardship to which the male is exposed has something to do with the matter. Tuberculosis becomes destructive and leads to fatality in proportion to the hardships to which the person who has had an implantation is exposed and the physical strain to which he is subjected.

A strange side-light comes out in this comparison of male and female prevalence and mortality of tuberculosis, in that the male is to a much greater extent an outdoor creature than the female. It would be difficult to determine accurately the relative time that

males and females spend indoors, but in a general way it can safely be stated that the average time of females within doors is at least double that of males. This would seem to show that physical hardship is perhaps a more potent factor in the development of tuberculosis than is want of fresh air.

SOCIAL CONDITION.

New cases,	Single,	339	734
	Married,	343	
	Widowed,	38	
	Separated,	11	
	No record,	3	
Summary for four years,	Single,	1566	3733
	Married,	1800	
	Widowed,	323	
	Separated,*	31	
	No record,	13	

In the city of Philadelphia during the year 1900, according to the United States Census Report, there were seven hundred and thirty-one thousand five hundred and nineteen single people, four hundred and seventy-six thousand three hundred married people, eighty-one thousand three hundred and thirty-nine widowed, and one thousand seven hundred and seventy-two divorced. Using these figures as a basis of calculation and comparison, 46.34 single people applied for treatment for every hundred thousand single people living in the city; 72 married people applied for treatment for every hundred thousand married people living in the city; 46.71 widowed people applied for treatment for every hundred thousand widowed people living in the city; and 6.20 separated people for every one thousand divorced people in the city, or, at the same ratio as the other conditions named, 620 separated people for every hundred thousand divorced people. The ratio of the widowed is practically the same as the ratio of the single, while the ratio of the married is nearly twice that of the single and widowed, and the ratio of the separated is more than ten times that of the widowed and the single.

* This record of separated is for two years only; in other words, out of 1389 cases.

At first glance these figures would lead one to believe that the married state predisposes to tuberculosis, and in former reports this view was given some countenance; but closer investigation shows that this is untrue. Tuberculosis is much less prevalent below the fifteenth year than above it. Of the seven hundred and thirty-one thousand five hundred and nineteen single people residing in the city of Philadelphia in 1900, three hundred and sixty-six thousand four hundred and two were under fifteen, which is more than one-half of the single people. Quite naturally this large proportion of single in the age period when tuberculosis is much less prevalent than it is during the age period in which people are married would greatly reduce the ratio of disease among single people.

According to Cornet's table on mortality from tuberculosis by age periods, the mortality under fifteen years of age averages 9.64 per ten thousand, and the mortality between fifteen and seventy years averages 38.78 per ten thousand of living people at these ages. The mortality under fifteen is only about one-fourth of that between fifteen and seventy. Were it possible to make an exact comparison, it probably would be found that for the same age period the ratio of single people who have applied for treatment is greater than the ratio of married people.

The summary for four years gives practically the same ratio as for the current year, except in the items of widowed and separated. The widowed, during the current year, have evidently materially decreased in numbers. The separated, in the summary, are given only for two years, as statistics were not taken prior to that time; and they also have decreased somewhat.

In olden times much stress was laid upon the general build of the individual, upon his physiognomy and appearance, in determining his susceptibility to tuberculosis. Such phrases as "the phthisical habit," "the consumptive look," and even "the consumptive complexion" and "the consumptive eye," were used. Many of the views that were held about the build of the

body and the general appearance of the body as indicative of a predisposition to tuberculosis were undoubtedly based upon misunderstanding, inasmuch as the early stages of tuberculosis were altogether unrecognized, and what was often interpreted as a predisposition to the disease was the disease itself.

HEIGHT.

Males who were...	Five feet eight inches or under,..240			
	Over five feet eight inches,.....176	443		
	No record of measurement,..... 27			734 new cases
Females who were.	Five feet four inches or under,...151			
	Over five feet four inches,.....116	291		
	No record of measurement,..... 24			

Average height of males for the current year, 5 feet 7 inches.
Average height of females for the current year, 5 feet 3 inches.

Males who were...	Five feet eight inches or under,..618			
	Over five feet eight inches, ...580	1295		
	No record of measurement,..... 97			Summary for three years, 2274
Females who were.	Five feet four inches or under, ..436			
	Over five feet four inches, ...444	979		
	No record of measurement, ... 99			

No record made first year.

COMPLEXION.

Number of patients who had,.....	Dark complexion,.....410		
	Light complexion,.....213		
	Red complexion,..... 34		734 new cases
	No record of complexion,..... 5		
	Negroes,..... 72		
Number of patients who had,.....	Dark complexion,.....624		
	Light complexion,.....423		
	Red complexion,..... 76		1389, summary for two years
	No record of complexion,..... 10		
	Negroes,.....256		

No record during first two years.

COLOR OF EYES.

Number of patients who had,.....	Dark eyes,..... 348		
	Light eyes,..... 376		734 new cases
	No record of color, ... 10		
Number of patients who had,.....	Dark eyes,..... 846		
	Light eyes,.....1021		3733, summary for four years
	No record of color,.....1866		

Large number of no records due to the fact that no detailed record was made during most of the first year.

RESULTS OF TREATMENT ACCORDING TO COMPLEXION.

Number of patients,..	Disease arrested,.....	3	Out of 213 who had light complexion
	Improved,.....	71	
	Unimproved,.....	72	
	Died,.....	21	
	Made only one visit,.....	46	
Number of patients,..	Disease arrested,.....	3	Out of 410 who had dark complexion
	Improved,.....	153	
	Unimproved,.....	144	
	Died,.....	37	
	Made only one visit,.....	73	
Number of patients,..	Disease arrested,.....	0	Out of 34 who had red complexion
	Improved,.....	15	
	Unimproved,.....	11	
	Died,.....	3	
	Made only one visit,.....	5	
Number of patients,..	Disease arrested,.....	0	Out of 72 negroes
	Improved,.....	32	
	Unimproved,.....	27	
	Died,.....	8	
	Made only one visit,.....	5	
Number of patients,..	Disease arrested,.....	3	Out of 348 who had dark eyes
	Improved,.....	135	
	Unimproved,.....	123	
	Died,.....	25	
	Made only one visit,.....	62	
Number of patients,..	Disease arrested,.....	4	Out of 376 who had light eyes
	Improved,.....	127	
	Unimproved,.....	131	
	Died,.....	43	
	Made only one visit,.....	71	

With our present knowledge it is extremely doubtful whether formation of the body or complexion is much of a predisposing factor in the disease. It is exceedingly difficult to get accurate data upon these subjects, and for this reason we have taken statistics upon height, complexion, and color of the eyes.

According to our figures it would not seem that there is anything in overgrowth as a predisposition to tuberculosis. The average height of the American male is less than five feet eight inches, and the average height of the American female is less than five feet two inches. These are the accepted averages, but it is quite possible that they have been based upon too small a number of measurements to be accurate. The American people are perhaps a little taller than the Europeans, but a very large number of measurements will have to be made over the entire country be-

fore we can get a correct average for them. We have placed the standard measurement for women at five feet four inches instead of five feet two inches, believing that this would be nearer the truth than the figures which are usually given. At any rate it is in closer harmony with the accepted average for males as shown by our table.

The tables on height which we have published in the past and the tables which we publish this year contain two elements of error which have recently come to light. Unfortunately we cannot eliminate these elements of error. We can only record a general corrective. One is an accidental constructional overmeasurement of one of our measuring rods, which was not discovered until after four and a half years' use. This rod was made by a very reliable firm, and the error of adjusting it to the scales was made by a workman whom the firm had apparently every reason to trust. The rod is one of five, but it is in the dispensary, where it is used for two clinics. It measured one and a half inches too much. The other source of error is in the admixture of statistics based upon statements of patients with the actual measurements made by the physicians. The number of cases of this kind is not very large and the measurements given by the patients usually are correct.

During the current year, out of four hundred and sixteen males measured 57.69% were five feet eight inches or under and 42.30% were over five feet eight inches. Out of two hundred and sixty-seven females measured, 56.55% were five feet four inches or under and 43.44% were over five feet four inches. For three years, out of one thousand one hundred and ninety-eight males measured 51.58% were five feet eight inches or under and 48.41% were over five feet eight inches. For the same period of time, out of eight hundred and eighty females measured 49.54% were five feet four inches or under and 50.45% were over five feet four inches.

Even allowing for the errors in our tables, less than one-half

of all the people who came for treatment were above the normal average of height. This is perhaps truer of the men than of the women, inasmuch as the normal height of women has been placed two inches higher than the accepted average height of women for this country. For the current year the average of both sexes based upon the total number of cases is near the normal.

Of the white people of whom a record was made during the year as regards complexion, 62.40% were set down as dark complexioned, 32.42% as light complexioned, and 5.17% as red complexioned. In the summary for two years of the white people of whose complexion a record was made, 55.56% were set down as dark complexioned, 37.66% as light complexioned, and 6.76% as red complexioned. As will be seen by a study of the tables on nativity and races, the increase in dark complexioned people during the current year is in harmony with the increase in the foreign element from southern Europe.

In regard to color of the eyes, out of seven hundred and twenty-four patients of whom a record was made for the current year 48.06% had dark eyes and 51.93% had light eyes. For the four years, out of one thousand eight hundred and sixty-seven patients of whom a record was made 45.31% had dark eyes and 54.68% had light eyes. Although the majority of patients were dark complexioned, there is a slight preponderance of light eyes over dark eyes. It is improbable that either the complexion or the color of the eyes means anything from the point of view of predisposition.

The results of treatment in patients of light complexion were: disease arrested, 1.79%; improved, 42.51%; unimproved, 43.11%; and died, 12.57%. The results of treatment in patients of dark complexion were: disease arrested, .89%; improved, 45.40%; unimproved, 42.73%; and died, 10.97%. The results of treatment in patients of red complexion were: disease arrested, .00%; improved, 51.72%; unimproved, 37.93%; and died, 10.34%.

The results of treatment in the negro were: disease arrested, .00%; improved, 47.76%; unimproved, 40.29%; and died, 11.94%.

The results of treatment in patients with dark eyes were: disease arrested, 1.04%; improved, 47.20%; unimproved, 43.00%; and died, 8.77%. The results of treatment in patients with light eyes were: disease arrested, 1.31%; improved, 41.63%; unimproved, 42.95%; and died, 14.09%.

Complexion and color of the eyes evidently have very little prognostic value. The mortality was greater in patients of light complexion and with light eyes than in patients of dark complexion and with dark eyes; but the percentage of patients with disease arrested was also greater.

AGE.

New cases,.....	Under 10 years,..... 11 10 to 20 years,..... 124 20 to 30 years,..... 233 30 to 40 years,..... 219 40 to 50 years,..... 101 Over 50 years,..... 45 No record,..... 1	734	Population of Philadelphia according to U. S. Census of 1900 in age periods:	
Summary for four years,...	Under 10 years,..... 68 10 to 20 years,..... 493 20 to 30 years,.....1178 30 to 40 years,.....1118 40 to 50 years,..... 588 Over 50 years,..... 278 No record,..... 10	3733	.....256,540 .....219,658 265,289	548,639

As a factor in the implantation and development of tuberculosis age has always been and is now of very great interest to the student of tuberculosis. We have at our command some interesting data bearing upon it, but many points will still have to be worked out before we can draw definite conclusions. We can in a measure determine from the statistics at our command the age periods at which tuberculosis attracts most attention and produces the largest number of fatalities, but we are not yet in a position to say much about the age periods at which implantations most frequently take place.

For the current year, out of seven hundred and thirty-three patients of whom a record was made as to age 1.50% were under ten years, 16.91% between ten and twenty years, 31.79% between twenty and thirty years, 29.87% between thirty and forty years, 13.77% between forty and fifty years, and 6.13% over fifty years. In the summary for four years, out of three thousand seven hundred and twenty-three patients of whom a record was made 1.82% were under ten years, 13.24% between ten and twenty years, 31.64% between twenty and thirty years, 30.03% between thirty and forty years, 15.79% between forty and fifty years, and 7.46% over fifty years.

There has been some falling off during the current year in the attendance of the high and low age periods and an increase in the attendance of the age periods between twenty and forty years. A decrease in the age period below ten years is in harmony with what we have a right to expect as the result of the crusade against tuberculosis, since this is the period which is most apt to benefit by the crusade. With the precautions which are now taken against implantation of tuberculosis there ought to be a large decrease in tuberculosis among children, because the children who have been born since the crusade began have had much greater protection against implantation than have the people who were born before that time.

We give in the table this year the number of people who were living in the city of Philadelphia during the census of 1900 in some of the age periods for the purpose of comparing the applicants for treatment with the number of people living at those age periods. We cannot give the population corresponding to our age periods after thirty, as the United States Census divides the age periods after thirty-five in the middle of the decades. We, however, give a summary of all over thirty.

Taking our summary for four years as a basis of study and dividing it by four to get the average yearly attendance for each age period, the proportionate attendance to population for each age

period would be: under ten years, 6.6 persons for every hundred thousand people living in that age period; between ten and twenty years, 56.1 persons for every hundred thousand people living in that age period; between twenty and thirty years, 111 persons for every hundred thousand people living in that age period; and over thirty years, 90.40 persons for every hundred thousand people living in that age period. It will thus be seen that much the greatest relative attendance at the Institute was in the age period between twenty and thirty.

OCCUPATION.

	Number of People Following Occupation in Philadelphia Census 1900.	For the Current Year.		Total for Four Years when Disease was Contracted.
		Occupation when disease was contracted.	*Occupation while treated.*	
Abattoir employee,		0	0	1
Actor,	961	0	0	1
Agent,	6,723	5	1	12
Amusement hall keeper,		0	0	3
Artificial flower maker,	315	1	0	1
Attendant in insane asylum,		0	0	1
Baker,	4,905	4	0	19
Barber,	4,404	6	2	28
Bartender,	3,093	6	1	28
Baseball player,		0	0	1
Blacksmith,	4,382	2	0	16
Boilermaker,	1,631	1	0	15
Bookbinder,	2,244	2	0	12
Bookkeeper,	9,027	3	0	10
Bootblack,		0	0	1
Bowling alley attendant,		0	0	2
Boxmaker,	1,948	2	0	19
Braider,		1	0	1
Brakeman,		1	0	9
Brass grinder,	1,441	0	0	1
Brass polisher,		3	1	6
Brewery hand,	850	0	0	3
Bricklayer (brick and stone masons*),	4,562	6	1	19
Brick maker,	1,204	0	0	2
Bridge builder,		0	0	4
Broom maker (broom and brush makers),	530	1	0	1
Brush maker (broom and brush makers),	530	1	0	3

*The Census Report combines these two occupations. We separate them, but add them together to get the proportion. The same is true of other combinations of occupations.

OCCUPATION.—(*Continued.*)

	Number of People Following Occupation in Philadelphia Census 1900.	For the Current Year.		Total for Four Years when Disease was Contracted.
		Occupation when disease was contracted.	*Occupation while treated.*	
Business man (merchants and dealers), retail,	23,045	0	0	1
wholesale,	1,199			
Butcher,	4,518	5	0	14
Button-hole maker,		3	0	3
Cabinet maker,	1,590	2	0	13
Candy maker (confectioners),	1,909	1	0	6
Canvasser (agents—trade and transportation),	6,723	0	0	4
Cap maker,		0	0	5
Car conductor (street railway employees),	73,472	1	1	18
Carpenter (carpenters and joiners),	10 685	10	1	52
Carriage maker,		0	0	1
Cementer,		0	0	2
Chair caner,		1	0	1
Chambermaid,		0	0	5
Chemist,		1	0	2
Child's nurse,		1	0	3
Cigar maker,	5,102	8	1	54
Clerk (clerks and copyists),	25,895	23	5	109
Cloth examiner,		1	0	2
Coalyard employee,		1	0	2
Collector,		1	1	6
Color mixer,		0	0	1
Cook (servants and waiters),	44,976	5	0	24
Cooper,	1,080	2	0	9
Coppersmith (copperworkers),	196	0	0	1
Courier,		0	0	1
Designer (architects, designers and draughtsmen),	1,994	0	0	1
Dish washer,		0	0	1
Draughtsman,		0	0	1
Dressmaker,	14,058	10	1	18
Driver (draymen, horsemen, teamsters),	19 147	14	1	97
Druggist,		1	0	2
Dyer,		2	0	19
Electrical worker (electrician),	2,509	1	0	8
Elevator employee,		2	0	9
Emery-wheel worker,		0	0	2
Engineer (engineers and firemen, not locomotive),	7,297	5	0	18
Engraver,	945	0	0	3
Factory hand,		28	9	155
Farmer (farmers, planters and overseers),	1,032	5	0	16
(agricultural laborers),	3,224			
File maker,		2	0	2
Fireman,		4	1	12
Fish cleaner,		1	0	2

OCCUPATION.—(*Continued.*)

	Number of People Following Occupation in Philadelphia Census 1900.	For the Current Year.		Total for Four Years when Disease was Contracted.
		Occupation when disease was contracted.	*Occupation while treated.*	
Florist (gardeners, florists, nurserymen, etc.),	1,185	1	1	5
Foreman (mill),		2	0	3
Foundryman (iron and steel workers),	9,874	0	0	6
Gardener,		1	0	4
Gas works employee,	315	2	0	4
Glass blower (glassworkers),	1,706	1	0	11
Glass-factory hand (glassworkers),	1,706	3	0	5
Glazier,		0	0	1
Gold preparer,		1	0	2
Grocer,		0	0	2
Harness-maker (harness and saddle makers and repairers),	568	0	0	1
Hatter (hat and cap makers),	909	1	0	1
Hospital orderly (male nurses),	307	0	0	1
Hostler,	1,357	1	0	5
House-worker,		156	100	844
Huckster (huckster and peddler),	2,575	2	1	15
Ice-cream vender,		0	0	1
Iceman,		0	0	4
Ice manufacturer,		0	0	1
Inspector,		0	0	3
Iron worker (iron and steel worker),	9,874	7	1	41
Janitor (janitor and sexton),	2,575	1	1	3
Jeweler,		0	0	1
Labeller,		0	0	1
Laboratory employee,		1	0	2
Labor boss,		0	0	1
Laborer [laborer (not specified)],	41,717	28	3	184
Laundry worker (laundresses and launderers),	5,926	2	0	28
Leather worker (leather curriers and tanners),	4,513	1	1	13
Letter carrier,		0	0	2
Librarian,		0	0	1
Lineman,		1	0	2
Lock worker,		0	0	1
Longshoreman,		3	1	6
Lumberyard employee,		0	0	4
Machinist,	15,050	17	7	79
Marble worker (marble and stone cutter),	1,621	3	1	5
Masseur,		0	0	1
Mechanic,		0	0	5
Merchant (see also business man),		1	0	16
Messenger boy (messengers and errand and office boys),	4,966	8	2	11
Metal worker,		0	0	3
Milk-man,		0	0	1
Mill hand (textile and mill operators),	19,587	37	6	153
Milliner,		1	1	10

OCCUPATION.—(*Continued.*)

	Number of People Following Occupation in Philadelphia Census 1900.	For the Current Year.		Total for Four Years when Disease was Contracted.
		Occupation when disease was contracted.	*Occupation while treated.*	
Millwright,		0	0	1
Miner,		0	0	16
Molder,		0	0	10
Morocco finisher,		4	0	17
Motorman,		4	0	5
Mover,		1	0	2
Musician (musicians and teachers of music),	2,974	2	0	6
Navy employee,		0	0	4
Newspaper vender (newspaper carriers and newsboys),	322	1	0	4
Nickel plater,		0	0	1
No occupation,		17	480	73
Nurse (nurses and midwives),	4,490	2	0	8
Odd jobs,		0	0	1
Office boy,		0	0	8
Officer Salvation Army,		0	0	2
Oil cloth worker,		0	0	1
Oil works employee,		0	1	2
Operator,		9	5	17
Optician,		1	0	1
Organ builder,		0	0	1
Oyster man,		1	0	5
Packer (packers and shippers),	2,715	3	1	18
Painter (painters, glaziers, and varnishers),	7,288	6	2	35
Paperhanger,	2,044	0	0	13
Peddler (hucksters and peddlers),	2,575	7	3	26
Pen maker,		1	0	4
Photographer,	631	0	0	2
Picture-frame maker,		1	0	1
Pipe cutter,		0	0	1
Plasterer,	1,052	1	0	8
Plaster-of-Paris worker,		0	0	1
Plumber (plumbers and gas and steam fitters),	5,269	1	0	19
Policeman (watchmen, policemen, firemen),	6,319	0	0	2
Poolroom attendant,		0	0	1
Porter (porters and helpers in stores, etc.),	1,476	3	0	21
Potter,	137	1	0	3
Presser,		4	0	20
Printer (printers, lithographers, and pressmen),	7,634	4	2	31
Ragsorter,		1	0	9
Rigger,		0	0	8
Reporter (journalists),	776	0	0	1
Riveter,		0	0	3
Rubber maker,		0	0	1
Sailor (soldiers, sailors, and mariners),	1,038	4	0	13

OCCUPATION.—(*Continued.*)

	Number of People Following Occupation in Philadelphia Census 1900.	For the Current Year.		Total for Four Years when Disease was Contracted.
		Occupation when disease was contracted.	*Occupation while treated.*	
Salesman,	16,318	6	2	29
Saleswoman,	7,832	7	4	26
Sawyer,		0	0	3
School-child,		59	30	174
Scissors grinder,		0	0	1
Scrubber,		2	1	5
Seamstress,	3,720	6	2	57
Sewing machine operator,	238	0	0	12
Shipper,		0	0	1
Shipwright,		1	0	1
Shirt-maker (shirt, collar, and cuff makers),	2,215	0	0	7
Shoemaker (boot and shoe makers and repairers),	6,102	3	2	25
Signalman,		0	0	1
Soldier,		0	0	5
Spiceroom worker,		0	0	1
Springmaker,		0	0	1
Stage hand,		0	0	1
Stand keeper,		2	2	6
Statue painter,		1	0	1
Steamfitter,		2	1	2
Steel worker (iron and steel workers),	9,874	1	0	1
Stenographer (stenographers and typewriters),	3,698	1	0	10
Stereotyper,		0	0	1
Stevedore,		3	0	17
Stoker,		0	0	2
Stone-cutter (marble and stone cutters),	1,621	1	0	19
Storekeeper's employee,		0	1	14
Street cleaner,		0	0	1
Street paver,		1	0	1
Student,		3	3	14
Suspender maker,		0	0	1
Tailor,	11,483	26	5	122
Teacher (teachers and professors in colleges),	5,930	4	0	12
Teamster (draymen, horsemen, and teamsters, etc.),	19,147	4	0	11
Telegraph operator (telegraph and telephone operators),	1,365	1	0	4
Telephone operator, (telegraph and telephone operators),		1	0	5
Terra-cotta worker,		1	0	1
Time keeper,		1	0	1
Tin plater (tinplate and tinware workers),	1,574	0	0	8
Tinsmith (tinplate and tinware workers),		5	4	5
Tin roofer (roofers and slaters),	1,105	0	0	6
Tool sharpener,		0	0	1

OCCUPATION.—(*Continued.*)

	Number of People Following Occupation in Philadelphia Census 1900.	For the Current Year.		Total for Four Years when Disease was Contracted.
		Occupation when disease was contracted.	*Occupation while treated.*	
Trunk maker,		1	0	1
Truss maker,		0	0	1
Turkish bath attendant,		0	0	1
Type-polisher,		0	0	1
Type-setter,		0	0	4
Type-writer,		0	0	1
Undertaker,	571	0	0	1
Upholsterer,	2,146	2	0	13
Violin maker,		0	0	1
Waiter (servants and waiters),	44,976	10	0	50
Washerwoman,		3	1	12
Watchmaker (watchmaker, clock and watch mender and repairer),	895	1	0	5
Watchman,		2	0	11
Weaver,		13	1	77
Wet nurse,		0	0	1
Wheelwright,	476	3	0	6
Window cleaner,		1	0	1
Wine-dealer,		1	0	2
Wood-chopper,		0	0	1
Wood-worker,		1	0	13
Woolsorter,		0	0	1
No occupation given,		7	28	70
		734	734	3733

The relationship of occupation to tuberculosis is a very complex subject and difficult to work out. So many elements enter into it, and there are so many chances for error in any calculation that can be made, that only approximate truth can be reached by even the most elaborate study.

Statistics upon this subject are apt to be misleading, because it is difficult to get accurate data upon the number of people who follow certain occupations in a given place, and therefore comparisons cannot be accurate. Even if one could take a circumscribed district and know accurately how many people lived in that district, there would still be the element of uncertainty in the relative number of people of different occupations who are able to take care of themselves and the relative sensitiveness of individuals about applying for aid at an institution for charity.

With a disease like tuberculosis, moreover, there is considerable chance of a larger number of people of one occupation than of another dying of tuberculosis in a given year and a larger number of another occupation in another year. It would really take many years of observation, a very definite district, with very accurate knowledge, to reach anything like exact truth. In spite of the difficulties in the way, however, interesting general deductions may be drawn from a careful study of occupation statistics in tuberculosis.

The data which we give in our table are for the current year and for the four years during which the institution has been in operation. Comparison of the figures for the current year with the figures for the four years brings out quite forcibly the discrepancies between certain years as to the relative number of people who have applied from certain occupations.

For the purpose of comparing the number of persons of different occupations who have applied for treatment with the respective number of people in these occupations, we publish this year in a separate column the number of persons following some of the occupations in the city of Philadelphia during the year 1900, according to the United States Census Report. It will be seen by this comparison that some occupations which apparently have a low attendance rate in reality have a high one; while others, which apparently have a high one, really have a comparatively low one. Blacksmiths and bookbinders, for example, both have the same number of cases applying for the current year, and at a ratio of four to three for the four years, and yet blacksmiths, taking the average for four years, had an attendance rate of .91 per thousand, and bookbinders of 1.33 per thousand. Again, cigarmakers and carpenters each had nearly the same number of applicants for the current year and also for the four years; and yet the comparison of the respective number of applicants with the respective number of persons employed in these occupations shows that the cigarmakers had an average yearly attendance of

2.64 per thousand, while the carpenters had an average yearly attendance of 1.21 per thousand. Shoemakers, salesmen, and saleswomen all three have nearly the same number of applicants for treatment for the four years, and yet the relative yearly attendance is for shoemakers 1.02 per thousand, for saleswomen .82 per thousand, and for salesmen .44 per thousand. Of course, relative inability to pay for treatment may have apparently increased the morbidity of the shoemakers.

A comparative study of the table brings other interesting surprises. The highest attendance rate, for example, is that of the sewing-machine operator, with 12.60 per thousand; next come the potter with 5.47 per thousand, the huckster and peddler with 3.97 per thousand, the seamstress with 3.83 per thousand, the stonecutter with 3.70 per thousand, the porter with 3.55 per thousand, the gasworks employee with 3.17 per thousand, the wheelwright with 3.15 per thousand, the sailor with 3.13 per thousand, and the newspaper vender with 3.10 per thousand. After these come the tailor with 2.65 per thousand, the cigarmaker with 2.64 per thousand, the boxmaker with 2.43 per thousand, the glassblower with 2.34 per thousand, the boilermaker with 2.29 per thousand, the bartender with 2.26 per thousand, the cooper with 2.08 per thousand, the tinsmith with 2.06 per thousand, and the cabinetmaker with 2.04 per thousand. Following these are the millhand with 1.95 per thousand, the plasterer with 1.90 per thousand, the packer with 1.75 per thousand, the telegraph and telephone operator with 1.64 per thousand, the paperhanger with 1.59 per thousand, the upholsterer with 1.51 per thousand, the driver and teamster and the broommaker and brushmaker each with 1.41 per thousand, the watchmaker with 1.39 per thousand, the tinroofer with 1.35 per thousand, the machinist with 1.31 per thousand, the coppersmith with 1.27 per thousand, the brassgrinder and brasspolisher and the carpenter each with 1.21 per thousand, the painter with 1.20 per thousand, the foundryman and iron worker and the laundry worker each with 1.18 per thou-

sand, the laborer with 1.10 per thousand, the clerk with 1.08 per thousand, the florist with 1.05 per thousand, the shoemaker with 1.02 per thousand, and the printer with 1.01 per thousand. In the next decimal below we have the baker with .96 per thousand, the farmer with .93 per thousand, the blacksmith and hostler each with .91 per thousand, the plumber with .90 per thousand, the brewery hand with .88 per thousand, the saleswoman with .83 per thousand, the photographer, electrical worker, and shirtmaker each with .79 per thousand, the candymaker with .79 per thousand, the butcher with .77 per thousand, the stenographer and typewriter with .74 per thousand, the leather worker with .72 per thousand, the engraver with .69 per thousand, the engineer with .61 per thousand, the messenger boy with .55 per thousand, the teacher and musician each with .50 per thousand, the nurse, harnessmaker, agent, and salesman each with .44 per thousand, the undertaker with .43 per thousand, the brickmaker with .41 per thousand, the dressmaker and reporter each with .32 per thousand, the janitor with .29 per thousand, the bookkeeper and hatter each with .27 per thousand, the actor with .26 per thousand, the canvasser with .14 per thousand, the designer with .12 per thousand, the business man with .10 per thousand, and the policeman with .07 per thousand.

It has not been possible to get definite data from the United States Census Report for some of the occupations which we have in our table, and therefore a comparative statement of the attendance of people of these occupations has not been made. Even of some of the occupations for which we have taken the United States Census returns the figures which we give are not entirely accurate because the nomenclature for occupation which we use is not exactly the same as that used by the United States. In some future report we hope to be able to give a comparison based upon more exact data.

Even with inaccuracies which may exist in our data some very interesting points crop out in the tables. Hardship and depriva-

tion are pointed to very strongly by the figures here given as two important factors in the implantation and development of tuberculosis, while outdoor and indoor life seem to play a secondary part to these. The sewing-machine operator, for instance, who undergoes physical fatigue under bad sanitary environments, and whose compensation is insufficient for maintenance of nutrition, stands at the head of the list, and the policeman, who has an easy life out of doors, with fair compensation, stands at the foot of the list. Of all the occupations named, these two probably are furthest apart in matters which make for good physical well-being.

Practically all occupations which involve severe physical effort, even when they are out of doors, have a high attendance rate. The relative position of the occupation is undoubtedly influenced also by such factors as dust, indoors, dissipation, and low wages. The potter, porter, boxmaker, cabinetmaker, and cooper have hard work, accompanied more or less by dust of one kind or another, and therefore have the most favorable conditions for implantations of tuberculosis through the dust and for development of the disease by reason of the hard work. The seamstress, cigarmaker, and tailor have relatively hard work under most unsanitary conditions and usually have poor pay. The huckster and peddler and the sailor are in the open air, but are hard worked, and, as a rule, have bad sleeping accommodations with poor compensation.

Some of the indoor occupations with easy labor and fair compensation have quite a low attendance rate. The clerk and bookkeeper, for instance, who are usually looked upon as the legitimate prey of consumption, stand quite low in the rate of attendance, and the business man who follows an indoor life stands next to the policeman. In fact, all occupations which give fair compensation and are not accompanied by severe physical labor have a relatively low attendance rate.

ALCOHOLISM.

New cases,.....	Alcoholism in patient,.....	179	Out of 734 cases
	No alcoholism in patient,.....	541	
	No record,.....	14	
	Alcoholism in preceding generation,....	197	
	No alcoholism in preceding generation,..	512	
	No record,.....	25	
	No alcoholism in either patient or preceding generation,.....	446	
Summary for four years,.....	Alcoholism in patient,.....	807	Out of 3733 cases
	Alcoholism in preceding generation,.....	776	

RESULTS IN PATIENTS WITH POSITIVE AND NEGATIVE HISTORY OF ALCOHOLISM.

Number of patients,..	With disease arrested,.....	2	Out of 179 who gave history of alcoholism
	Improved,.....	40	
	Unimproved,.....	76	
	Who died,.....	35	
	Who made only one visit,...	26	
Number of patients,..	With disease arrested,.....	5	Out of 541 who gave history of no alcoholism
	Improved,.....	217	
	Unimproved,.....	178	
	Who died,.....	34	
	Who made only one visit,...	107	

No record in previous reports.

RESULTS IN PATIENTS WITH POSITIVE AND NEGATIVE HISTORY OF ALCOHOLISM IN PRECEDING GENERATION.

Number of patients,..	Disease arrested,.....	3	Out of 197 who gave history of alcoholism in preceding generation
	Improved,.....	60	
	Unimproved,.....	77	
	Died,.....	22	
	One visit only,.....	35	
Number of patients,..	Disease arrested,.....	4	Out of 512 who gave history of no alcoholism in preceding generation
	Improved,.....	194	
	Unimproved,.....	174	
	Died,.....	39	
	One visit only,.....	101	

THE USE OF TOBACCO.

Number of patients,..	Who used tobacco,	Smoked,.....	199	322 — 443 males
		Chewed,.....	27	
		Smoked and chewed,.....	96	
	Who did not use tobacco,.....		119	
	Of whom no record was made as to use of tobacco,.....		2	

No record in previous reports.

RESULTS IN PATIENTS WITH POSITIVE AND NEGATIVE HISTORY OF USE OF TOBACCO.

Number of patients,..	With disease arrested,.....	2	Out of 322 who gave a history of use of tobacco
	Improved,.....	101	
	Unimproved,.....	116	
	Who died,.....	50	
	Who made only one visit,...	53	
Number of patients,..	With disease arrested,.....	2	Out of 119 who did not give a history of use of tobacco
	Improved,.....	44	
	Unimproved,.....	46	
	Who died,.....	5	
	Who made only one visit,...	22	

No record in previous reports.

This record is only on males; there were 443 males treated, but there were 2 on whom no record was taken as to the use of tobacco.

We have from the beginning taken statistics on alcoholism with the view of determining what influence alcohol may have on the implantation and development of tuberculosis. We also have for some time taken statistics on the use of tobacco with a view of determining its influence, if any, upon the implantation and development of tuberculosis. This year, in addition, we give tables on results in patients who have used alcohol to excess; who have used tobacco; and whose ancestors have used alcohol to excess.

For the current year 24.86% of the patients of whom a record was made gave a history of alcoholism, and 75.13% denied a history of alcoholism. For preceding generations 27.78% of the patients whose record was taken admitted a history of alcoholism, and 72.21% denied it. In 60.76% of the patients of whom a record was taken alcoholism was denied in both the individual and in the preceding generation. In the summary for four years, out of the total number of patients treated 21.62% are recorded as having given a history of alcoholism and 20.78% as having given a history of alcoholism in the preceding generation. These latter percentages are somewhat misleading, since they are based upon the entire number of cases treated and not upon the cases of which a record was made. This no doubt is the explanation of the difference between the percentages for the current year and the percentages for four years.

For the current year the percentage of patients who have an individual history of alcoholism is considerably less than that of patients who have a family history of alcoholism; while for the four years the percentage of patients with a personal history of alcoholism is somewhat larger than that of patients with a family history of alcoholism. Taking all the data together, it looks as though alcoholism may be on the decrease.

The table of results in patients who had a history of alcoholism is quite interesting and points to deductions which in a measure are in harmony with what we have had reason to suspect for some time. The patients who gave a history of alcoholism showed the largest percentage of disease arrested and also the largest percentage of unimprovement and death. The advantage is in favor of non-alcoholism. As the record stands, 1.30% of the alcoholics had the disease arrested, as against 1.15% of the non-alcoholics; 26.14% of the alcoholics are recorded as improved, as against 50% of the non-alcoholics; 49.67% of the alcoholics are set down as unimproved, as against 41.01% of the non-alcoholics; and 22.87% of the alcoholics are recorded as having died, as against 7.83% of the non-alcoholics. Adding the two items disease arrested and improvement together, we have for the alcoholics a total of 27.44%, as against 51.15% for the non-alcoholics; showing nearly twice as good a result for the non-alcoholics as for the alcoholics. In the other two items of unimproved and death we have 49.67% unimproved and 22.87% deaths, making a total of 72.54% of bad results for the alcoholics, as against 41.01% unimproved and 7.83% deaths, making a total of 48.84% of bad results for the non-alcoholics. Both in the favorable and in the unfavorable results the advantage is on the side of the non-alcoholic almost to the extent of 100%. It certainly does look as though, at least in the development of tuberculosis, alcoholism is a very unfavorable factor. The only item in which alcoholics show better results than non-alcoholics is "disease arrested," and in this there is only a slight

difference. One might perhaps well say that the apparent advantage of the alcoholics over the non-alcoholics in this item is accidental and means nothing. It is not safe, however, to jump at such a conclusion. The deduction indicated by the table is in harmony with general clinical experience.

For some reason or other an alcoholic with tuberculosis when he comes under treatment either does very badly or does remarkably well. He is very prone to pneumonia and nephritis and is apt to be carried off by these complications; but if he escapes these and improves at all, his improvement is rapid and often phenomenal. It would look as though alcohol had some curative value in tuberculosis, but it is a very dangerous remedy, since it is difficult to use it without doing secondary injury.

The table on results of patients who gave a family history of alcoholism is also very interesting, and, strange to say, points to deductions almost identical with those in the table on results in patients with an individual history of alcoholism. In percentages the record shows that 1.85% of the patients with a family history of alcoholism had the disease arrested, as against .97% of the patients with a family history of non-alcoholism; 37.03% of those with a family history of alcoholism were improved, as against 47.20% of those with a family history of non-alcoholism; 47.53% of those with a family history of alcoholism were unimproved, as against 42.33% of those with a family history of non-alcoholism; and 13.58% of those with a family history of alcoholism died, as against 9.48% of those who gave a family history of non-alcoholism.

In the item of disease arrested the patients with a family history of alcoholism show even better results than do the patients with a personal history of alcoholism. In a measure this antagonizes the idea that alcohol may have a curative value in tuberculosis, since it would seem to indicate that whatever beneficial value alcohol may have in tuberculosis the value must be of such a character as to make it transmissible from parent to offspring.

The idea here suggests itself that alcohol itself being a poison to the human organism may stimulate resistance to other poisons as well as itself, and thus within limits set up some immunity against tuberculosis.

On the use of tobacco we have taken statistics for one year only. So far as our statistics go they are quite interesting. Of the patients about whom a record was made as to the use of tobacco 44.10% used tobacco in some form or another and 55.89% did not use it. No women are recorded as having used tobacco. Of the four hundred and forty-three males treated, 72.68% used tobacco, 26.86% did not use it, and of .45% no record was made. Of the persons who used tobacco 61.80% smoked only; 8.38% chewed only; and 29.8% both chewed and smoked.

The table on results shows that better results were obtained in patients who did not use tobacco than in those who did use it. In percentages .74% of the patients who used tobacco had the disease arrested, as against 2.06% of those who did not use it; 37.54% of those who used tobacco were recorded improved, as against 45.36% of those who did not use it; 43.12% of those who used tobacco were put down as unimproved, as against 47.47% of those who did not use it; and 18.58% of those who used tobacco were recorded as having died, as against 5.15% of those who did not use it. Adding up the two favorable records, namely, disease arrested and improved, we have 38.28% favorable records of those who did use tobacco, as against 47.42% of those who did not use it; and adding up the two unfavorable records we have 61.70% unfavorable of those who used tobacco, as against 52.62% of those who did not use it. The preponderance of favorable results for those who did not use tobacco is not quite as large as the preponderance of favorable results for non-alcoholics, but is also pretty large.

Here again, as with alcoholism, we have merely evidence as to the influence of tobacco on the development and mortality of

tuberculosis and not upon implantation. The preposterous claim which has been made that tobacco is a preventive of tuberculous implantation cannot be maintained, however, in the presence of the statistics here given of a large number of tobacco users who have developed tuberculosis. More than two-thirds of the males who applied for treatment used tobacco in one form or another. The statistics here given, if they have any meaning at all, would seem to indicate that the use of tobacco has a predisposing influence for the implantation of tuberculosis. In fact, the extensive use of tobacco by males may be one of the explanations why tuberculosis is at present so much more prevalent among males than among females.

The damaging influence of tobacco in tuberculosis is probably exercised through the circulation. Tobacco undoubtedly depresses the heart and interferes to some extent with vigorous circulation. It is generally conceded that anything which depresses the circulation interferes with nutrition and consequently predisposes to tuberculosis both in implantation and development.

RESIDENCE.

New cases,	Philadelphia,	655	734
	Pennsylvania,	54	
	Other States,	25	
	No record,	0	
Summary for four years,	Philadelphia,	3422	3733
	Pennsylvania,	189	
	Other States,	118	
	No record,	4	

There has been a marked improvement in the frequency of change of residence during this year as compared with the previous year. The average number of changes last year was 4.48, as compared with 1.97 this year, and the number of patients who made no change at all during this year was ten, as compared with two during the previous year. This improvement no doubt is due to public education and perhaps to financial improvement of patients consequent upon extended aid.

CHANGE OF RESIDENCE.

- Number of patients, ..
  - New cases, 734 .
    - Who changed place of residence,..... 687 — Aggregate number of changes, 1349; Average number of changes, 1.97
    - Who did not change place of residence,..... 10
    - Of whom no record was made as to change of residence,..... 37
  - Summary for three years, 2274
    - Who changed place of residence,.....1817 — Aggregate number of changes, 5238; Average number of changes, 2.88
    - Who did not change place of residence,..... 183
    - Of whom no record was made as to change of residence,..... 274

No record on first year's cases.

Of the eighteen hundred and seventeen patients whose record as to change of residence has been kept for three years, the average number of changes was 2.88. This means that eighteen hundred and seventeen patients lived each on an average in nearly three houses during one year, and that instead of eighteen hundred and seventeen houses having been contaminated, five thousand four hundred and fifty-one houses were contaminated. What applies to the patients who have been under observation at the Phipps Institute applies to all poor consumptives, and it may be assumed that in Philadelphia, in which there are over three thousand deaths a year from consumption, five to eight thousand houses are contaminated every year by consumptives in a contagious stage of the disease.

Opponents of registration of tuberculosis ought to find in these figures reason for a change of attitude. That thousands of families should yearly be exposed to implantation of tuberculosis through public neglect and without opportunity to protect them-

selves is a severe arraignment of public intelligence in the present state of scientific knowledge upon the subject of tuberculosis.

HOUSING.

Number of patients,	Who lived in apartment houses,	173	734 new cases
	Who lived privately,	539	
	No record,	22	
	Who lived in apartment houses,	501	Summary for four years, 3733
	Who lived privately,	1426	
	No record,	1806	

Large number of "no records" due to fact that no detailed record was made during most of the first year.

HOUSEHOLD CONDITIONS.

Number of patients of whom record was made as to the number of persons in the household,	708	Total number in household,	4770	Out of 734 new cases
		Average number in household,	6.73	
Number of patients of whom record was made as to the number of sleeping rooms used by the family,	688	Total number of sleeping rooms,	2493	Out of 734 new cases
		Average number of sleeping rooms,	3.62	
Number of patients of whom record was made as to the number of beds used by the family,	679	Total number of beds,	2825	Out of 734 new cases
		Average number of beds,	4.16	
Number of patients of whom record was made as to the number of persons in the household,	1318	Total number in household,	8332	Out of 1389, summary for two years
		Average number in household,	6.32	
Number of patients of whom record was made as to the number of sleeping rooms used by the family,	1305	Total number of sleeping rooms,	4428	Out of 1389, summary for two years
		Average number of sleeping rooms,	3.39	
Number of patients of whom record was made as to the number of beds used by the family,	1281	Total number of beds,	4944	Out of 1389, summary for two years
		Average number of beds,	3.86	

Record taken for two years only.

The term apartment house as used in the table on housing includes all dwellings in which more than one family lives, and does not convey the strictly technical idea usually conveyed by that term. The real apartment house for the poor has not yet come

in vogue in Philadelphia and practically does not exist. The dwellings which are used for more than one family are, however, perhaps more objectionable than the real apartment house, because they have been originally built for one family only. As a rule, the sanitary condition is very bad and the plumbing is inadequate for the number of people which the house accommodates. Even the water is not carried beyond the first floor, and sometimes not even into the building. In many instances the toilet facilities are limited to an old-fashioned outdoor water-closet, and almost invariably the heating arrangements are of the most primitive character. Many of these houses have no drainage at all and have dark, badly ventilated, filthy cellars. The top windows cannot be lowered and the lower windows can only be raised on a stick. It is almost impossible to make such houses fit to live in, particularly in winter, when the question of keeping warm has to be considered; and they really should not under any circumstances be permitted to be occupied by more than one family.

The household conditions as shown by our table, when taken as a whole, look better than they really are because the good are averaged up with the bad. The average number of people in a household has increased slightly, but the average number of beds to the family has also increased, and in a greater proportion than the average number of people in a household. The average number of sleeping rooms has decreased in about the same proportion as the average number of persons in the household has increased.

The household conditions of the patients who have been under treatment during the year have deteriorated somewhat as compared with the household conditions of patients under treatment during the year before. This may be in a measure accounted for by the increase in the number of colored patients and of immigrant patients of the lower order. The housing of the colored poor is unusually bad, as is also the housing of many of the poor immigrants.

WORK.

New cases,	Who worked indoors,	174	734
	Who worked outdoors,	18	
	Who did not work,	535	
	No record,	7	
Summary for three years,	Who worked indoors,	845	2274
	Who worked outdoors,	103	
	Who did not work,	1267	
	No record,	59	

No record made first year.

EARNING CAPACITY OF PATIENTS BEFORE ILLNESS.

Patients who when working,	New cases, with occupation, 717	Had earned something, 607	Total earnings per day,	$554.73	
			Average earnings per day,	.91	
		Had earned nothing, 110			
	Summary for three years, with occupation, 2201	Had earned something, 1248	Total earnings per day,	$1467.91	
			Average earnings per day,	1.17	
		Had earned nothing, 667			
		No record of earnings, 286			

No record made first year.

Of the seven hundred and thirty-four patients treated during the year, seven hundred and seventeen, 97.68%, had occupation of some kind before illness. Of these, 84.65% had an earning capacity. The average earnings per day were 91 cents. As there were fifty-nine school-children, eight messenger boys, and one hundred and fifty-six houseworkers, and there were only one hundred and ten people without earning capacity, it is evident that a good many houseworkers and probably some school-children must have recorded themselves as having earning capacity. The earning capacity of all of these must have been low, and would reduce the average earning capacity.

In the summary for three years, out of two thousand two hundred and one patients with occupation, twelve hundred and forty-eight, 56.70%, had earned something; six hundred and sixty-seven, 30.30%, had earned nothing; and of two hundred and eighty-six, 12.99%, no record was made as to earnings. The average earnings were $1.17 a day. This average no doubt is increased by the large number of no records, and perhaps also by the large number recorded as having earned nothing.

It is quite probable that there is some inaccuracy in the record upon which the summary for three years is based, as the number of persons who had no earning capacity seems too high. It may be that the question as to earning capacity before illness was not always fully understood, and it may be too that the truth was sometimes suppressed by the patient.

EARNING CAPACITY OF PATIENTS DURING ILLNESS.

- Patients working,.....
  - New cases, 192
    - Who earned something,..... 97
      - Total earnings per day,.....$105.63
      - Average earnings per day,..... $1.09
    - Who earned nothing,..... 94
    - Of whose earnings no record was made,..... 1
  - Summary for three years, 948.....
    - Who earned something,.....494
      - Total earnings per day,.....$657.38
      - Average earnings per day,..... $1.33
    - Who earned nothing,.....453
    - Of whose earnings no record was made,..... 1

No record made first year.

The average earning capacity of 91 cts. a day has quite a bearing upon the tuberculosis problem. Lack of comforts of life and good food are strong predisposing causes of tuberculosis. As a general rule, occupations which have the hardest physical labor give the smallest compensation, and small compensation can bring very few comforts of life. Hard physical labor, poor

food, and unhygienic home environment are the strongest predisposing causes of tuberculosis, and as they all go with low earning capacity, the relationship between an average earning capacity of 91 cts. a day and a high morbidity of tuberculosis is quite apparent.

SICK BENEFITS.

Patients, 734.....	Who got sick benefits,...	72	Total benefits per week,	$472.50
			Average benefits per week,.....	$6.56
	Who did not get sick benefits,.....	652		
	No record,.....	10		
Summary for three years, 2274.....	Who got sick benefits,...	228	Total benefits per week,	$1250.03
			Average benefits per week,.....	$5.48
	Who did not get sick benefits,.....	1835		
	No record,.....	211		

No record made first year.

DEPENDENTS.

New cases,.....	Who had others to support,.....	387	734
	Who did not have others to support,.....	336	
	Of whom there was no record as to others to support,.....	11	
Summary for three years,.....	Who had others to support,.....	1188	2274
	Who did not have others to support,.....	992	
	Of whom there was no record as to others to support,.....	94	

No record made first year.

SICKNESS IN THE HOME.

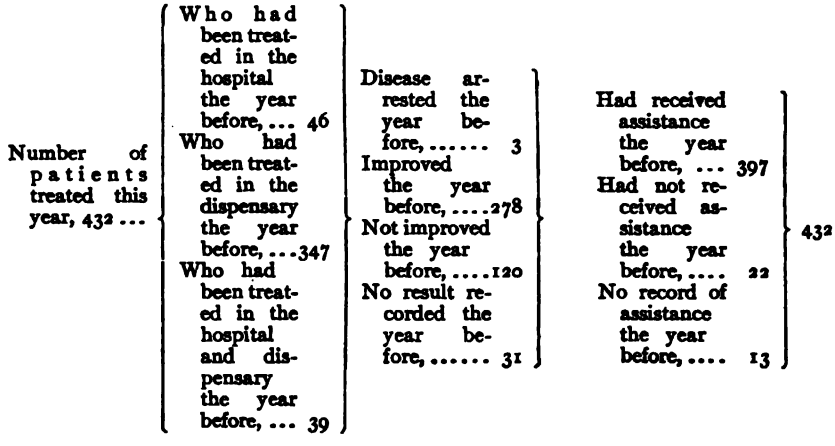
New cases,.....	Who had others sick in the home,.....	32	734
	Who did not have others sick in the home,.....	163	
	Of whom no record was made as to others being sick in the home,.....	539	
Summary for three years,.....	Who had others sick in the home,.....	162	2274
	Who did not have others sick in the home,.....	778	
	Of whom no record was made as to others being sick in the home,.....	1334	

No record made first year.

One of the most deplorable features about tuberculosis is that, owing to its long duration, poor people who have the disease are compelled to work. In acute diseases, the duration being short

and the symptoms severe, the afflicted individual submits to the demands of nature and rests, thereby giving the organism the necessary conditions for recovery. With the same conditions given for tuberculosis it is probable that all cases would recover, since the tendency to recovery in this disease is very great.

RETURN PATIENTS.


Number of patients treated this year, 432 ...
Who had been treated in the hospital the year before, ... 46
Who had been treated in the dispensary the year before, ...347
Who had been treated in the hospital and dispensary the year before, ... 39
Disease arrested the year before, ... 3
Improved the year before, ...278
Not improved the year before, ...120
No result recorded the year before, ... 31
Had received assistance the year before, ... 397
Had not received assistance the year before, ... 22
No record of assistance the year before, ... 13
432

During the current year, out of seven hundred and twenty-seven cases of which a record was made, one hundred and ninety-two, or 26.40%, worked while suffering from the disease, and five hundred and thirty-five, or 73.59%, did not work. Of those who worked, 9.37% worked out of doors, and 90.62% worked indoors. For the four years, out of two thousand two hundred and fifteen cases of which a record was made as to work, nine hundred and forty-eight, or 42.75%, worked, and twelve hundred and sixty-seven, or 57.25%, did not work. Of those who worked, 10.86% worked out of doors and 89.13% worked indoors. As will be seen, the percentage of patients who worked is smaller for the current year than for the four years. This in all probability is due to the educational campaign which has been carried on, inculcating the necessity for rest while a person is suffering from

tuberculosis. It will also be noted that the percentage of outdoor workers has decreased more than the percentage of indoor workers. This probably is largely due to the difficulty of getting light outdoor work for persons who have tuberculosis.

Of the one hundred and ninety-two patients who were recorded as working during illness for the current year, 50.52% earned something by their labor, 48.95% earned nothing by their labor, and of .52% no record was made as to earning capacity. Of the ninety-seven who earned something, the average earnings per day were $1.09. In the summary for three years, out of nine hundred and forty-eight patients who worked during illness, 52.10% earned something by their labor, 47.78% earned nothing, and of .10% no record was made as to earnings. The average earning capacity per day of the four hundred and ninety-four patients who earned something was $1.33.

A comparison of the earning capacity of the patients who were working while sick with the earning capacity of the patients who were working before they were taken sick, shows that the average earning capacity of the patients who worked while sick was greater than the earning capacity of the patients who worked before illness. This probably is due to the fact that only patients who held positions of fair earning capacity with light labor were apt to work during illness.

Of the patients who were treated during the year, out of seven hundred and twenty-four of whom a record was made only 9.94% received sick benefits, and the average sick benefits per week were $6.56. Of the two thousand and sixty-three patients of whom a record was made for three years as to sick benefits, only 11.05% received sick benefits, and the average sick benefits per week were $5.48. Nearly 90% of the patients received no sick benefits. It is evident from these statistics, even with due allowance for the suppression of the truth in order to get benefits from the Institute, that our working people make very little provision for a rainy day.

Of seven hundred and twenty-three patients of whom a record

was made during the current year as to dependents, 53.52% had others to support and 46.47% did not have others to support. Of the two thousand one hundred and eighty patients of whom a record was made as to dependents for three years, 54.49% had others to support and 45.50% did not have others to support. More than one-half of the patients who were treated had others depending upon them.

Of one hundred and ninety-five patients of whom a record was made during the current year as to sickness in the home, 16.41% had others sick in the home; and of nine hundred and forty patients about whom a record was made for three years as regards sickness at home, 17.23% had others sick in the home.

A careful comparison of the tables on work, earning capacity of patients before illness, earning capacity of patients when working as patients, dependents, and sickness in the home, gives a very graphic picture of the poverty and distress of the poor who suffer from tuberculosis. An average earning capacity of ninety-one cents a day when well; an average incapacity of 50% of the patients for earning anything at all during illness; an average of 50% of patients with dependents; and an average of 17% of the patients with sickness in the home, shows us a condition of things which is truly deplorable, and which makes not only for an implantation of tuberculosis, but for the development of the disease when it has been implanted.

The last of this group of tables, on the "return patients," shows very graphically how dependent the poor are upon continual support and assistance when they once have been stricken with tuberculosis. Four hundred and thirty-two patients who were treated in the Institute during the current year had been treated during the preceding year, and of these 91.89% had received assistance the year before, and 69.32% had been improved during the year before but had to continue their treatment, largely because they needed the assistance during the current year.

PREVIOUS DISEASES.

New cases who gave a history of having had — Out of 734 cases

Typhoid fever,	144
Pneumonia,	128
Pleurisy,	172
Influenza,	223
Measles,	479
German measles,	32
Mumps,	179
Chicken-pox,	125
Rickets,	14
Malaria,	100
Whooping-cough,	225
Smallpox,	29
Herpes zoster,	6
Scarlet fever,	104
Diphtheria,	55
Epilepsy,	6
Marasmus,	31
Syphilis,	29
Gonorrhea,	126
Rheumatism,	139
Vaccination,	670

Summary for two years, Persons who gave a history of having had, — Out of 1389 cases

German measles,	64
Mumps,	321
Chicken-pox,	273
Rickets,	28
Herpes zoster,	22
Epilepsy,	10
Marasmus,	64
Gonorrhea,	226
Vaccination,	1217

Summary for four years, Persons who gave a history of having had, — Out of 3733 cases

Typhoid fever,	669
Pneumonia,	690
Pleurisy,	905
Influenza,	858
Measles,	1521
Malaria,	452
Whooping-cough,	882
Smallpox,	122
Scarlet fever,	389
Diphtheria,	221
Syphilis,	131
Rheumatism,	595

Of the patients who were treated for tuberculosis during the current year, .81% had had epilepsy and herpes zoster, 1.90% had had rickets, 3.95% had had syphilis and smallpox, 4.22% marasmus, 4.35% German measles, 7.49% diphtheria, 13.62% malaria, 14.16% scarlet fever, 17.02% chicken-pox, 17.16% gonorrhea, 17.43% pneumonia, 18.93% rheumatism, 19.61% typhoid fever, 23.43% pleurisy, 24.38% mumps, 30.38%

influenza, 30.65% whooping-cough, 65.25% measles, and 91.28% had been vaccinated. Out of one thousand three hundred and eighty-nine cases for which a record has been kept for two years, .71% had had epilepsy, 1.58% herpes zoster, 2.01% rickets, 4.60% German measles and marasmus, 16.27% gonorrhea, 19.65% chicken-pox, 23.11% mumps, and 87.61% had been vaccinated. In the summary for four years, out of three thousand seven hundred and thirty-three patients treated 3.26% had had smallpox, 3.50% syphilis, 5.92% diphtheria, 10.42% scarlet fever, 12.10% malaria, 15.93% rheumatism, 17.92% typhoid fever, 18.48% pneumonia, 22.98% influenza, 23.62% whooping-cough, 24.24% pleurisy, and 40.74% measles.

These figures give an excellent basis for study of modern sanitation and epidemiology, but do not throw much light upon tuberculosis itself. What the predisposing or restricting influence of these diseases upon tuberculosis may be cannot be worked out now. With more knowledge of the influence of certain pathogenic micro-organisms upon the tissues of the body and the length of time during which such micro-organisms may be harbored by the body we may be able to draw conclusions.

From the epidemiologic point of view it is interesting to note that measles still stands at the head of the list of diseases which afflict mankind, and that whooping-cough, pleurisy, influenza, and mumps are close seconds. Considering the prevalence of typhoid fever it is surprising to find the percentage of patients who have had typhoid fever so small. This is also true of pneumonia.

A very striking side-light on smallpox and vaccination comes out in the comparison of the percentage of patients who had smallpox, namely, 3.95%, with the percentage of patients who had been vaccinated, namely, 91.28%. Only 8.72% of all the patients who were treated had not been vaccinated, which is only about twice the number of patients who had smallpox. In other words, although only 8.72% of the total number of patients presented good soil for the development of smallpox by going un-

protected, 3.95% got the disease. This ought to give us a good idea of what the prevalence of smallpox would be if the entire population were unprotected by vaccination.

CHILDHOOD.

Patients who had,..	Been breast-fed children,.....	605	734 new cases
	Been bottle-fed children,.....	60	
	No record,.....	69	
	Been of good health during first five years of life,.....	589	
	Been of bad health during first five years of life,.....	97	
	No record of health condition,.....	48	
Patients who had,..	Been breast-fed children,.....1103		1389, summary for two years
	Been bottle-fed children,.....	103	
	No record,.....	183	
	Been of good health during first five years of life,.....1040		
	Been of bad health during first five years of life,.....	189	
	No record of health condition,.....	160	

No record for first two years.

Careful students of tuberculosis have in recent years expressed the view that most cases of tuberculosis are implanted in childhood and develop only in advanced life. So far we have no very definite information on this subject, and the Institute is taking statistics with a view of throwing light upon it. For two years we have made inquiry into the condition of health during the first five years of life of each patient with a view of determining whether there has been any relationship between the disease and ill health in early life.

We have also taken statistics on the infant-feeding of patients to determine if possible whether or not cows' milk might have anything to do with implantation, as claimed by von Behring.

During the current year, out of six hundred and sixty-five cases on which a record was made as to mode of feeding in infancy 90.97% were breast-fed and 9.02% were bottle-fed. Out of six hundred and eighty-six cases on which a record was made as to the condition of health during the first five years of

life 85.86% were recorded as having had good health and 14.13% as having had bad health. For two years, out of twelve hundred and six cases on which a record was made on mode of feeding in infancy 91.45% were breast-fed and 8.54% were bottle-fed. Out of twelve hundred and twenty-nine cases on which a record was made as to the condition of health during the first five years of life 84.62% were recorded as having had good health and 15.37% as having had bad health.

So far as one can read anything out of these figures, cows' milk has little to do with implantation of tuberculosis in human beings. Moreover, if implantation of tuberculosis takes place in infancy it rarely manifests itself by ill health. It must be candidly admitted, however, that there is nothing in these figures which militates against von Behring's theory.

SOURCE OF CONTAGION.

New cases,	Preceding generation,	213	Out of 734 cases
	Immediate generation,	330	
	Succeeding generation,	25	
	Consort's family,	51	
	Fellow-employees,	125	
	Contaminated houses,	27	
	Source not discovered,	260	
	No record,	2	
	More than one source,	134	
Summary for four years,	Preceding generation,	968	Out of 3733 cases
	Immediate generation,	978	
	Succeeding generation,	124	
	Consort's family,	311	
	Fellow-employees,	412	
	Contaminated houses,	174	
	Source not discovered,	1422	
	No record,	113	
	More than one source,	650	

The etiology of tuberculosis is now pretty well understood so far as the general principles are concerned, but many points still remain obscure in matters of detail. The disease, being due to a living micro-organism, is communicable, and on this point there can be no two ways of thinking; but on the mode of communication everything is not clear.

According to the usually accepted meaning of words, tuberculosis is a contagious disease ordinarily and an infectious disease exceptionally. It is a contagious disease when it is conveyed directly from one person to another, and it is an infectious disease when it is conveyed from a diseased animal to a human being through meat and milk, or from one human being to another through the agency of flies and insects of various kinds. In most cases, no doubt, the mode of conveyance from one person to another is by contagion.

The contagiousness of tuberculosis differs from the contagiousness of acute diseases in that the individual who has tuberculosis can always be made non-contagious through his own efforts without isolation, while the individual suffering from acutely contagious diseases can only be made non-contagious by isolation and not through his own efforts. In practice this is of great importance.

The source of seed-supply in any particular case of tuberculosis is exceedingly difficult to make out because of the dormancy of the disease for a long period of time and its long-drawn-out course even when it has developed. With the prevalence of tuberculosis, moreover, almost everybody has been exposed to the disease at one time or another, to implantation either by contagion or by infection. Under the circumstances we can only determine the probable source of implantation by the longest and most intense exposure. We may reasonably assume that where a person is exposed in various ways the exposure which was longest and most intense is the one which most likely gave the implantation.

The records which we have made of the source of contagion give the most likely source of implantation in a large number of cases. The relative percentage of various sources of implantation is fairly harmonious between the current year and the summary for four years, except that as we grow in experience in history taking we find the source of contagion in a larger number

of cases, and the contagion which was active enough to give implantations groups itself more and more around the family tree.

For the current year, out of seven hundred and thirty-two cases of which a record was taken 29.09% gave the preceding generation as a probable source of implantation; 45.08% the immediate generation; 17.07% fellow-employees; 6.96% the consort's family; 3.68% contaminated houses; and 3.41% the succeeding generation. In 35.51% of the cases the source of contagion was not discovered; and in 18.30% more than one source of contagion pronounced enough to give the source of implantation was recorded.

In the summary for four years, out of three thousand six hundred and twenty cases for which a record was made 26.74% gave the preceding generation as a probable source of implantation; 27.01% the immediate generation; 11.38% fellow-employees; 8.59% consort's family; 4.80% contaminated houses; and 3.42% the succeeding generation. In 39.28% the source of contagion was not discovered; and in 17.95% there was more than one source of contagion indicated.

The percentages here given must not be taken absolutely. They give an approximate idea of the most likely sources from which the cases have sprung. In more than one-third of the cases the source of contagion was not elicited. In part this is due to the difficulty of getting a correct history from persons who do not speak the English language, and in part to the aversion of many to reveal a family history of tuberculosis.

Family relationship is the most prolific source of implantation. Contagion from the immediate generation, that is, from brothers and sisters and cousins, gives the largest percentage of cases, and contagion from the preceding generation, that is, from parents, uncles, and aunts, gives the next largest percentage; contagion from fellow-employees and consort's family gives quite a large number of implantations and contagion from contaminated

houses a surprisingly small number. It is evident that the contagion from contaminated houses has been exaggerated. Statistics which have been taken on contaminated houses in the past no doubt have been vitiated by the element of family contagion which could not readily be eliminated from statistics of that kind. The number of implantations from succeeding generations is, as one would expect, small.

Our statistics point forcibly to the conclusion that family relationship is the most potent factor in the spread of tuberculosis. They explain the traditional belief in the heredity of tuberculosis. The high percentage of implantations from immediate and preceding generations gives the foundation for the former belief in heredity. The popular observation that tuberculosis is a family disease was correct, but the interpretation of the phenomena which had been observed was incorrect.

DURATION OF THE DISEASE.

Number of cases,	New cases,	Less than 2 years,	345	734
		2 to 5 years,	214	
		5 to 10 years,	94	
		10 to 20 years,	56	
		Over 20 years,	16	
		No record,	9	
	Summary for four years,	Less than 2 years,	1715	3733
		2 to 5 years,	1157	
		5 to 10 years,	423	
		10 to 20 years,	257	
		Over 20 years,	64	
		No record,	117	

ATROPHY OF THE SCAPULAR MUSCLE.

Number of patients who had the scapular muscle more atrophied,	On the right side,	176	734 new cases
	On the left side,	127	
	On neither side,	408	
	No record,	23	
Number of patients who had the scapular muscle more atrophied,	On the right side,	493	2274, summary for three years
	On the left side,	245	
	On neither side,	1379	
	No record,	157	

No record made first year.

CLUBBED FINGERS AND CURVED NAILS.

New cases, ..	Fingers were recorded as having been,..	Clubbed,.....237		
		Not clubbed,.....487	734	
		No record,..... 10		
	Nails were recorded as having been,....	Curved,.....319		
		Not curved,.....405	734	
		No record,..... 10		
Summary for two years,	Fingers were recorded as having been,..	Clubbed,.....432		
		Not clubbed,.....936	1389	
		No record,..... 21		
	Nails were recorded as having been,....	Curved,.....606		
		Not curved,.....761	1389	
		No record,..... 22		

No record for first two years.

The duration of tuberculosis must be closely studied side by side with contagion for the elucidation of both subjects. Neither of them can be worked out without the aid of the other. A knowledge of the source of implantation is necessary to determine the duration of the disease, and a knowledge of the duration of the disease is necessary to determine the source of implantation. Accurate scientific data now at our command leave no doubt about the long period of dormancy of the disease nor even of its activity without striking symptoms.

We really have no way of accurately measuring the duration of tuberculosis, since we cannot determine the period of dormancy. Measuring the duration of the disease from the time of exposure to contagion would be inaccurate, since every individual has some resistance, and in most cases there must be some time of exposure before implantation takes place. The appearance of symptoms which attract attention cannot safely be taken as the starting-point of the disease, because we know that in the majority of cases the disease has been active and has even destroyed tissue before it has attracted attention. For these reasons approximate ideas of duration can only be formed and for reaching conclusion all available data must be used.

The tables which we give on duration of the disease are based

upon the judgment of the physician after he has heard the story of the patient. They manifestly understate the duration of the disease, and they do so because it is difficult for the physician, even when he has been trained to take statistics of this kind, to connect the exposure with the development of symptoms and make correct deductions from the data at hand. The tables show, however, that as men get more experience they make the time longer.

For the current year, out of seven hundred and twenty-five cases on which records were made 47.58% were recorded as having had the disease less than two years; 29.51% as having had the disease from two to five years; 12.96% as having had the disease from five to ten years; 7.72% as having had the disease from ten to twenty years; and 2.20% as having had the disease over twenty years.

For the four years, out of three thousand six hundred and sixteen cases 47.42% were recorded as having had the disease less than two years; 31.99% as having had the disease from two to five years; 11.69% as having had the disease from five to ten years; 7.10% as having had the disease from ten to twenty years; 1.77% as having had the disease over twenty years. As will be seen by comparing the percentages for the four years with the percentages for the current year, there is a perceptible increase all along the line of the duration of the disease, except between the duration period of two to five years during which there has been a decrease, this decrease going principally to the increase of the higher duration periods.

Some of the earmarks of duration of tuberculosis are atrophy of the muscles of the chest and changes in the finger-nails. Ordinarily these conditions have a bearing on the duration of the disease, but too high a value must not be placed on them. This is particularly true of the changes in the finger-nails. For some reason not yet explained many cases of tuberculosis show neither clubbing of the fingers nor curved nails, even after long duration

of the disease, while others show them after very short duration of the disease. Clubbing of the fingers may even occur in persons who have not tuberculosis.

For the current year, out of seven hundred and eleven cases on which a record was made 24.75% had the scapular muscles more atrophied on the right side, and 17.86% on the left, making a total of 42.61% in which there was evidence of excess of atrophy of the scapular muscle on one or the other side. In 57.38% of the cases there was no excess of atrophy on either side.

For the period of three years during which a record has been kept, out of a total of two thousand one hundred and seventeen cases upon which statistics were taken 23.28% were recorded as having the scapular muscle more atrophied on the right side, and 11.57% as having the scapular muscle more atrophied on the left side, making a total of 34.85% of excess of atrophy for both sides. The total percentage of the two sides for the current year is considerably greater than the total percentage of the two sides for the three years, and here again, no doubt, the experience of men in making observations accounts for the increase. A comparison of the table on duration of the disease with the table on atrophy of the scapular muscles will show considerable harmony between the percentage of cases which were recorded as having a duration of over two years and the percentage of cases which had the muscles atrophied on one side or the other.

The total percentage of cases which are recorded as having had the disease over two years during the current year was 52.39%, and for four years 52.55%; and the total number of cases in which the scapular muscles were atrophied during the current year was 42.61%, and for three years was 34.85%. The total number of cases in which the duration of the disease was over five years for the current year was 22.88% and for four years was 20.56%. It is quite evident from these figures

that a close relationship exists between duration of the disease over five years and atrophy of the scapular muscles on one side or the other.

A much larger percentage of cases show atrophy of the scapular muscles on the right side than on the left, indicating apparently that the disease is older on the right side than on the left. As has been pointed out in former reports, this is in harmony with the prevalent idea that tuberculosis of the lungs begins more frequently on the right side than on the left.

Out of seven hundred and twenty-four cases on which statistics were taken during the current year as to clubbed fingers 32.73% were recorded as having clubbed fingers and 67.26% as not having clubbed fingers. Out of seven hundred and twenty-four cases on which statistics were taken as to curved nails 44.06% were recorded as having curved nails and 55.93% as not having curved nails. In the summary for two years during which statistics have been taken on this subject, out of one thousand three hundred and sixty-eight cases 31.57% were recorded as having clubbed fingers and 68.42% were recorded as not having clubbed fingers; and out of one thousand three hundred and sixty-seven cases on which a record was taken as to curved nails 44.33% were recorded as having curved nails and 55.66% as not having curved nails.

A larger number of cases is recorded as having curved nails than as having clubbed fingers. This may be due to diverse interpretation of what constitutes a clubbed finger and a curved nail. What one man might call a clubbed finger another might readily call a curved nail. If the percentage of the two conditions is added together, the sum-total will show that the majority of cases had either curved nails or clubbed fingers. In many cases, no doubt, both conditions existed, and considerable allowance must be made in the general total for this concomitancy.

PLACE OF BEGINNING OF TUBERCULOSIS OF THE LUNGS.

New cases,	Right apex,	466	734
	Left apex,	102	
	Not determined,	156	
	Examination incomplete,	7	
	Not tuberculosis of lungs,	3	
Summary for four years,	Right apex,	2369	3733
	Left apex,	775	
	Not determined,	574	
	Examination incomplete,	12	
	Not tuberculosis of lungs,	3	

RIGHT-HANDED AND LEFT-HANDED IN RELATIONSHIP TO INVOLVEMENT.

Number of patients who had	Primary lesion at right apex, and were	Right-handed,	429	466	Out of 724 examined cases
		Left-handed,	23		
		Not recorded,	14		
	Primary lesion at left apex, and were	Right-handed,	93	102	
		Left-handed,	6		
		Not recorded,	3		
	Primary lesion not determined, and were	Right-handed,	149	156	
		Left-handed,	4		
		Not recorded,	3		

No record in previous reports. The total in this table is seven hundred and twenty-four instead of seven hundred and thirty-four on account of seven cases not being examined, and three cases being tuberculosis of other structures than the lungs, like, for instance, the bones.

The place of beginning of tuberculosis of the lungs has always been a very interesting subject to physicians and has recently been more than usually under discussion and investigation. Calmette in his very interesting experiments upon animals found the first evidence of tubercles in the anterior apex of both lungs near the visceral pleura. These tubercles were found within thirty to forty-five days after injection of the bacilli into the animal. If the dose of bacilli was not too large, recovery took place and scar tissue remained; but if repeated injections of bacilli were given, caseation and breaking down ensued. Why in human beings the disease develops more rapidly on one side than the other we do not know.

In our series of cases, out of seven hundred and twenty-four for the current year the beginning of the disease was recorded as having taken place in the right apex in 64.36%; in the left apex in 14.08%; and undetermined in 21.54%. For the four years, out of three thousand seven hundred and eighteen cases the primary lesion was recorded in the right apex in 63.71%; in the left apex in 20.84%, and undetermined in 15.43%. As will be seen, the average for the current year is in pretty close harmony with the average for the four years.

Many explanations have been offered for the greater frequency of primary development of tuberculosis in the right apex than in the left, but no conclusive evidence has been given in favor of any view that has so far been expressed. As yet we have no data upon the subject which can be used as the basis of even a fair hypothesis.

With a view of determining whether greater or lesser activity of the side of the body might have an influence in determining the primary lesion, we have taken statistics on right-handedness and left-handedness and have compared these statistics with the clinical diagnoses of the primary lesions. Out of four hundred and sixty-six cases in which primary lesion was recorded in the right apex 92.06% were right-handed; 4.93% were left-handed, and of 3% no record was made. Out of one hundred and two cases in which the primary lesion was recorded in the left apex, 91.17% were right-handed; 5.88% were left-handed; and of 2.94% no record was made. Of the hundred and fifty-six cases in which the primary lesion was not determined, 95.51% were right-handed; 2.56% were left-handed, and of three or 1.92% no record was made. It is quite evident from the figures here given that right-handedness has no bearing whatever upon the primary development of tuberculosis in the right side.

Of the seven hundred and twenty-four tuberculous patients of whom a record was made during the current year, according to the clinical findings, 33.43% had one lung involved; 66.71% had

both lungs involved; 21.40% had three lobes involved; 25.41% had more than three lobes involved; and 4.28% had the intestines involved. For the four years, out of three thousand four hundred and twenty-six cases upon which a record was made 32.40% had one lung involved; 67.60% had both lungs involved; 21.24% had three lobes involved; 24.92% had more than three lobes involved; and 14.77% had other organs involved. A comparison of these records with the pathological report will show that they are understatements of the actual involvement rather than over-statements.

TISSUE INVOLVED.

New cases,	One lung,	242	Out of 724* cases
	Both lungs,	483	
	Three lobes,	155	
	More than three lobes,	184	
	Intestines,	31	
	Reproductive organs,	2	
	Kidneys,	12	
	Other organs,	3	
Summary for four years,	One lung,	1110	Out of 3709* cases
	Both lungs,	2316	
	Three lobes,	728	
	More than three lobes,	854	
	Other organs,	506	
	No record,	283	

According to these tables, more than two-thirds of the patients who applied for treatment came at a stage of the disease when recovery is difficult, and when, if it does take place, it means invalidism in a relative sense for the rest of life. Herein lies the burden of the tuberculosis problem—a social burden heavy enough to stagger almost any community. No one who has had both lungs involved can again be strong and vigorous enough to compete with those who never have had tuberculosis, and when persons advanced to this stage are restored to a fair condition of health they can only maintain that health by a life of moderate

* During the current year there were ten cases which either did not have tuberculosis of the lungs or had no complete record. In the summary for four years twenty-four cases are not reported on for the same reason.

activity. This means that when a poor person advanced to that stage recovers with the aid which is extended him he maintains his health only so long as the helping hand is held out. The moment assistance is withdrawn he relapses and goes under. Usually the family is too poor to give the necessary aid, and the stricken individual either depends upon charity or succumbs to the disease.

This explains the high ultimate mortality from tuberculosis even among those who have been restored to a physical condition of health in institutions for the treatment of this disease. Results which are obtained in such institutions cannot be made permanent unless a way is found of helping those who have been restored to a mode of life which takes them out of the ordinary struggle for existence. Positions at fair incomes must be given to people of this kind, or else they must be removed to colonies which are partially supported by public or private charity. There is no better field for philanthropic work than the establishment of such colonies.

It would be feasible to establish farm colonies for the care of tuberculous subjects who have recovered in institutions for the treatment of tuberculosis not only on a self-supporting basis but perhaps even on an investment basis. Many people who have gone through the treatment would be very glad to work in an institution of this kind for six months and even for a year or two at a salary which would barely cover the cost of living. With intelligent supervision and proper management the employment of people of this kind at small salaries would at least support such an institution and might pay a small interest upon the capital invested.

Our records of examination of sputum are not as complete as they should be, since there is still a large number of cases for which there is no record of even a single examination. At first blush one would think that incomplete records of this kind are the result of either carelessness or bad management, but those who have had experience in the running of an institution in which the coöperation of ignorant people is necessary will understand that

the incompleteness of records of this kind may be due to other causes than neglect on the part of the institution. Some of the shortcomings in our table undoubtedly are due to occasional breaks in the machinery of the Institute, but the majority are due to the difficulty of getting material from the patients for examination. With the improvement of our organization we hope to make our records more complete.

TUBERCLE BACILLI IN SPUTUM.

Number of patients,..	For this year, 734,.....	Recorded as having had sputum examined,...	Once,..... 495	Bacilli present,. 358 Bacilli absent,.. 171
			More than once, ... 34	
		With no record of sputum examination,..... 205		
	For four years, 3733,.....	Recorded as having had sputum examined,...	Once,.....1792	Bacilli present,.1304 Bacilli absent,. 668
			More than once,.... 180	
		With no record of sputum examination,.....1761		

Out of seven hundred and thirty-four patients who have presented themselves for treatment during the year an examination of the sputum is recorded in five hundred and twenty-nine cases, or 72.07%. Of these, one examination was recorded in 93.57% and more than one in 6.42%. Of the cases examined, tubercle bacilli were found in 67.67% and were not found in 32.32%. No examination is recorded in 27.92% of the total number of cases.

During the four years, out of three thousand seven hundred and thirty-three cases the sputum was examined in one thousand nine hundred and seventy-two cases, or 52.82%. Of these, it was examined once in 90.87% and examined more than once in 9.12%. Tubercle bacilli were found in 66.12% and were not found in 33.87%. No examination is recorded in 47.17% of the total number of cases.

It is difficult to say what negative or positive element exists in the cases in which the sputum was not examined, but the probabilities are that this element is in favor of a lower percentage of cases in which the tubercle bacillus is found. Cases in which a sputum examination is not made are usually those in which it is difficult to get sputum because the patient either does not expectorate at all or expectorates so little that he does not care to take the trouble to gather the sputum. When people expectorate profusely, they usually are anxious to have the sputum examined, and will do all they can to facilitate this examination.

If the table on tubercle bacilli in the sputum is carefully compared with the table on amount of tissue involved, and the two tables are studied together, one gets a much clearer conception of the unreliability of tubercle bacilli in the sputum as a means of diagnosing tuberculosis, particularly when a single examination of sputum is made. For the current year, out of seven hundred and twenty-four cases only 33.43% were recorded as having one lung involved; and for the four years, out of three thousand four hundred and twenty-six cases upon which a record was made 32.40% had one lung involved. Only those cases in which but one lung was involved were likely to have been incipient cases under any circumstances, and to have been free from tubercle bacilli on this account, but it is very probable that many of the cases which are recorded as having had only one lung involved had broken-down tissue. While the percentage of cases in which bacilli were absent is in very close harmony with the percentage of cases in which one lung was involved, it is also in harmony with the percentage of cases in which examination of sputum was not made. The probabilities are that the majority of the cases in which no examination of sputum was made were cases in which only one lung was involved, and that many of the cases in which no bacilli were found were really cases with broken-down tissue.

GLANDS.

Patients who were recorded as having had enlargement of	Cervical glands	148	Out of 734 cases
	Axillary glands	90	
	Inguinal glands	95	
	Cervical and axillary glands	28	
	Cervical and inguinal glands	20	
	Axillary and inguinal glands	7	
	Cervical, axillary, and inguinal glands	27	
Patients who were recorded as having had enlargement of	Cervical glands	287	Out of 1389, summary for two years
	Axillary glands	172	
	Inguinal glands	191	
	Cervical and axillary glands	50	
	Cervical and inguinal glands	49	
	Axillary and inguinal glands	20	
	Cervical, axillary, and inguinal glands	51	

No record for first two years.

DEPRESSION ABOVE CLAVICLES.

Number of patients who had greater depression above.	Right clavicle	344	734 new cases
	Left clavicle	83	
	Neither clavicle	289	
	No record	18	

No record in previous years.

SPINAL CURVATURE.

Patients who were recorded as having had	Spinal curvature	180	734
	No spinal curvature	522	
	No record of spinal curvature	32	
Summary for two years of patients recorded as having had	Spinal curvature	333	1389
	No spinal curvature	985	
	No record of spinal curvature	71	

No record for first two years.

GENERAL APPEARANCE.

Number of patients whose general appearance was	Good	331	734 new cases
	Bad	395	
	Not recorded	8	
	Good	1035	Summary for three years, 2274
	Bad	1175	
	Not recorded	64	

No record made first year.

It is now generally conceded that tuberculosis is an insidious, slowly progressive disease with periods of dormancy which leaves earmarks in its wake because of its destructive character. Destruction of tissue is an important feature of the cycle of life of the tubercle bacillus because it is usually through destruction of tissue that the bacillus makes its exit from a host and maintains its life until it can get into a new host or back into the same host. For the same reason that tuberculosis is a destructive disease it is also essentially a local disease, although it may ultimately invade all the tissues of the body. The terminal stage is always decay and decay is necessarily local.

Among students of tuberculosis the consensus of opinion at the present day seems to be that the tubercle bacillus gains entrance into the body through the lymphatic system and that tuberculosis is primarily a lymphatic disease. This has not been settled, but can be accepted as a working hypothesis. The work of Harbitz, Calmette, Nageli, Bugge, Burkhardt, Lubarsch and a host of others seems to prove conclusively that the lymphatic system is the ordinary channel of entrance of the tubercle bacillus and that the lymphatic glands are primarily affected in nearly all cases. The glands which are usually affected first are either the bronchial or the mesenteric lymphatic glands, and during the stage of involvement of these glands there are practically no symptoms of sufficient importance to attract attention.

Whether the respiratory tract or the alimentary canal is the more frequent port of entry of the tubercle bacillus has not been settled, but investigators agree that entrance takes place by both. For awhile it was held that admission was always by the respiratory tract; then the other extreme view, that it was always by the alimentary canal, was adopted. Thorough and painstaking work by advocates of both theories has finally proved that admission is by both routes, and perhaps as often by the one as by the other. Entrance often occurs by way of the tonsils and the pharynx, but these parts are looked upon as a subdivision of the

alimentary canal, and when entrance occurs in this way it is charged up to the alimentary canal.

It has been pretty well proved that the tubercle bacillus may pass through a lymphatic gland without leaving behind any traces of its presence. In such cases no visible damage is done to the lymphatic gland. Often, however, a struggle goes on in the lymphatic gland which leaves either damage or destruction in its wake. A histological study of a gland which has been invaded usually reveals changes which bear testimony to the presence of the bacillus. Inoculation of animals with the gland itself or implantation of the gland in the tissues of animals often reveals the presence of tubercle bacilli in these glands by growth in the animal when they cannot be discovered even microscopically. Raw claims that when serious damage is done to the lymphatic glands by the tubercle bacillus the seed-supply has been derived from a bovine source. He looks upon glandular tuberculosis as bovine in type. According to his view, the tubercle bacillus of human type passes through the lymphatic glands without doing much damage.

Our statistics on glands have been taken on clinical observation and can only be accepted as ordinary superficial evidence of lymphatic involvement at a stage of the disease when other organs and tissues of the body have become affected. They perhaps teach more from the negative point of view than from the positive, as they show us how evasive lymphatic tuberculosis is to the ordinary observation of even the trained eye of the physician. Probably every one of our cases has had tuberculosis in some of the lymphatic glands either before or at the time of taking statistics, and yet, as the table shows, lymphatic enlargement was found in a relatively small percentage of cases.

For the current year our table shows that out of seven hundred and thirty-four cases palpable enlargement was recorded in 20.16% for the cervical glands, 12.26% for the axillary glands, 12.94% for the inguinal glands, 3.81% for the cervical and axillary

glands, 2.72% for the cervical and inguinal glands, .95% for the axillary and inguinal glands, and 3.67% for the cervical, axillary, and inguinal glands. In the summary for two years, out of thirteen hundred and eighty-nine cases palpable enlargement was recorded in 20.66% for the cervical glands, 12.38% for the axillary glands, 13.75% for the inguinal glands, 3.59% for the cervical and axillary glands, 3.52% for the cervical and inguinal glands, 1.43% for the axillary and inguinal glands, and 3.67% for the cervical, axillary, and inguinal glands.

Depression above the clavicles often is a landmark of damage done by the tubercle bacillus, but when so it is a milestone much further along the route of destruction than the enlargement of the lymphatic glands. When tissue has been destroyed in the upper part of the lungs, a contraction of the chest wall takes place through nature's effort at healing, and the earliest place in which this contraction becomes evident is above the clavicle. The side on which the greater amount of depression exists is usually the side on which the greater amount of damage has been done, and for this reason the relative proportion of depression above the clavicle is a fair indication of the part of the lungs in which the disease began. It must be admitted, however, that depression above the clavicle may exist without damage to the lung.

For the current year, out of seven hundred and sixteen cases on which a record was made 48.04% had greater depression above the right clavicle, 11.59% had greater depression above the left clavicle, and 40.36% had greater depression on neither side. A comparison of these percentages with the percentages of the place of beginning of tuberculosis of the lungs shows a distinct harmony between them.

The large number of cases which show marked depression above the clavicle gives a good index of the stage of the disease at which people come for treatment. Vastly the majority had noticeable depression above one or the other clavicle, showing that the disease had existed long enough to permit of sufficient

destruction of tissue for visible contraction on one or the other side of the chest. As contraction is an evidence of progress toward recovery, this condition shows, too, that in the majority of cases nature had made a great effort to save the stricken individual, and that failure had probably resulted from depressing influences and secondary complications encountered by the individual in his struggle for existence.

For the current year, out of seven hundred and two cases upon which a record was made as to spinal curvature 25.64% were recorded as having spinal curvature, 74.35% as not having it. For two years, out of thirteen hundred and eighteen cases on which a record was made as to spinal curvature 25.26% were recorded as having spinal curvature and 74.73% as not having it.

Spinal curvature cannot in all instances be accepted as an evidence of damage done by tuberculosis, but in many it undoubtedly is due to the ravages of this disease. Spinal curvature of a mild form, if due to tuberculosis at all, is probably due to a secondary influence of the tubercle bacillus, and not to its destructive powers. The curvature ensues upon a weakened muscular system in many of these cases and in no sense is due to destruction of tissue of the vertebræ. It may be that the weakness of the muscular system is indirectly due to the poison set up by lymphatic tuberculosis. There can be no doubt, however, that muscular weakness may be due to other causes and that many spinal curvatures are due to other disease than tuberculosis. Spinal curvature due to destruction of tissue of the vertebræ is always due to tuberculosis, and when it occurs is evidence of a long struggle of the individual against the disease.

It will be seen by the tables that spinal curvature in tuberculosis occurs very much less frequently than depression above the clavicle, but a little more frequently than enlargement of the lymphatic glands. While occurring more frequently than enlargement of the lymphatic glands, it probably has very much less to do with the disease, and yet of this we cannot speak positively

at the present time. Not until we are able to measure accurately the indirect influence of the toxin of the tubercle bacillus upon the muscular system will we be able to make a correct comparison between these two conditions.

The general appearance of patients who came under treatment, as will be seen from the table, was good in pretty nearly as many cases as it was bad. For the current year, out of seven hundred and twenty-six patients on whom a record was made it was good in 45.59% and bad in 54.40%. In three years, out of two thousand two hundred and ten patients on whom a record was made it was good in 46.83% and bad in 53.16%. Usually a tuberculous subject is supposed to give evidence of his disease in his general appearance, and the consensus of opinion in the past has been that consumption is synonymous with emaciation. This fallacy evidently sprang from the universal failure of recognizing tuberculosis in its early stages. Formerly the disease was recognized only when the patient was on the brink of the grave. Gradually consumption was found to be an advanced stage of what came to be known as tuberculosis, but even then it was usually discovered when cavities and tubercles coexisted in the same individual. Only in very recent times has the true beginning of tuberculosis come to be recognized, and only since then has the general appearance of a tuberculous subject prior to the terminal stage been recorded. As we see the facts now, it would appear that tuberculosis in itself does not always cause emaciation in the individual, and it is only after enough destruction or alteration of tissue has occurred to interfere with the physiological processes of the body or a serious mixed infection has taken place that marked changes in the individual occur.

From what we know now, it seems probable that the old ideas of the phthisical habit or the consumptive appearance on which our forefathers laid so much stress was the result of a long poisoning from the tubercle bacillus and not a predisposing condition of the disease. The bright eye, the delicate form, and the

tint of skin which in the past were looked upon as an inherited tendency to tuberculosis we now recognize as the product of the tuberculous toxin. The insidious influence of this toxin upon the nervous system and upon the nutritive organs of the body, perhaps also upon the development of the muscular system, apparently can bring about the general appearance which has become the classical picture of the inherited predisposition to the disease.

CONDITION OF THE THROAT.

Number of patients who were recorded as having the throat...

Congested,.....	293	734	New cases
Not congested,.....	404		
No record,.....	37		
Inflamed,.....	79	734	
Not inflamed,.....	617		
No record,.....	38		
Pale,.....	111	734	
Not pale,.....	587		
No record,.....	36		
Congested,.....	910	2274	Summary for three years
Not congested,.....	972		
No record,.....	392		
Inflamed,.....	236	2274	
Not inflamed,.....	1552		
No record,.....	486		
Pale,.....	351	2274	
Not pale,.....	1511		
No record,.....	412		

No record made first year.

CONDITION OF THE TONSILS.

Tonsils were recorded as having been ..	Atrophied,..... 32	734	new cases
	Not atrophied,..... 660		
	No record,..... 42		
Tonsils were recorded as having been ..	Enlarged, ... 112	734	new cases
	Not enlarged,..... 582		
	No record,..... 40		
Tonsils were recorded as having been ..	Atrophied,..... 52	1389,	summary for two years
	Not atrophied,..... 952		
	No record,..... 385		
Tonsils were recorded as having been ..	Enlarged,..... 177	1389,	summary for two years
	Not enlarged,..... 947		
	No record,..... 265		

No statistics by clinician for first two years.

HOARSENESS.

Number of patients who had hoarseness,.....
- New cases,..... { Persistent, ... 65 / Temporary, ... 339 } Out of 734 cases
- Summary for four years,..... { Persistent,..... 400...Out of 3733 cases / Temporary,....1080...Out of 2274 cases

During the first year there was a record made on "persistent hoarseness" only.

We have for three years taken records on conditions of the throat; for two years on conditions of the tonsils; and for four years on hoarseness. The purpose of gathering these statistics was to get some light upon the conditions and symptoms of the upper air-passages which occur in tuberculosis.

Our statistics are not very satisfactory. At first blush one would think that taking statistics upon these subjects would be very easy, and inasmuch as the throat and tonsils can be inspected accurate information ought to be attainable. This would all be true were a standard available for all the conditions upon which statistics have been taken. Unfortunately this is not the case, and what detracts still further from the accuracy of the records is that the statistics have been taken by a large number of men each of whom has his own ideas about what constitutes congestion, inflammation, enlargement, and atrophy.

Strange as it may seem, even throat men do not agree upon the meaning of these terms and have no standard by which they can compare observations. What looks like congestion to one man apparently means a normal condition to another, and what one man terms inflammation another man calls congestion. Different men have different ideas of what constitutes a normal tonsil, and it is often a matter of judgment and not of measurement whether the tonsil is hypertrophied or atrophied. In the nature of things, what is merely a matter of judgment and not of measurement can only be approximately correct.

Even with the defects, however, something has been accomplished by taking the statistics, and much is to be gained by a

careful study of them. From the negative point of view they show how much training is required to make a good physician, and how alert the doctor must be in looking for damage that may occur in any part of the body.

As to the condition of the throat for the current year, out of six hundred and ninety-seven cases 42.04% were recorded as having the throat congested; out of six hundred and ninety-six cases 11.35% were recorded as having it inflamed; and out of six hundred and ninety-eight cases 15.90% were recorded as having it pale. This means that nearly 70% of the cases which came for treatment had an abnormal condition of the throat as determined by the eye on careful inspection and according to the opinions of men who have been trained to pass judgment on such conditions.

In the summary for three years, out of one thousand eight hundred and eighty-two cases on which a record was made 48.35% were set down as having the throat congested; out of one thousand seven hundred and eighty-eight cases 13.19% were recorded as having the throat inflamed; and out of one thousand eight hundred and sixty-two cases 18.85% were recorded as having the throat pale. In the summary for three years the percentage of abnormal throats is larger than for the current year.

Out of six hundred and ninety-two cases in which observations were made during the current year as to atrophy of the tonsils 4.62% were recorded as having the tonsils atrophied; and out of six hundred and ninety-four cases in which observations were made during the current year on enlargement of the tonsils 16.13% were recorded as having the tonsils enlarged. For two years, out of one thousand and four cases on which a record was made 5.17% were recorded as having the tonsils atrophied; and out of one thousand one hundred and twenty-four cases on which a record was made 15.74% were recorded as having the tonsils enlarged.

For the three years, as for the current year, nearly 70% of the patients who came under treatment had some abnormal condition

of the throat according to the judgment and careful observation of the physician in charge, and over 20% of the cases on which records were made had an abnormal condition of the tonsils. The probabilities are that these percentages understate the truth, and that the number of persons with tuberculosis who have an abnormal condition of the throat and tonsils is even much larger than the records here would indicate.

Recent careful investigation shows that the pharynx and especially the tonsils play a rôle in the implantation of tuberculosis. The data which we give would seem to indicate that they also play an important part in the development of the disease. It is quite possible that the throat and the tonsils by becoming culture-beds for micro-organisms are frequently sources of mixed infection in tuberculosis, and often keep up this mixed infection by supplying new seed to the tissues further down.

The condition of the throat and tonsils should be constantly kept under observation in the treatment of tuberculosis and every effort should be made to restore them to and maintain them in a normal condition. Not only does recovery depend upon this to a very great degree, but protection against recrudescence does so likewise. A patient who has a diseased pharynx and diseased tonsils rarely does well so long as this condition continues, and even when he does make a spurt forward along the line of improvement, usually has relapses.

Hoarseness in tuberculosis is a symptom which may indicate very different conditions. Sometimes it is dependent upon involvement of the larynx, but frequently it is associated with abnormal conditions of the pharynx and with depression of the nervous system. Persistent hoarseness usually is due to some tuberculous lesion of some part of the larynx, while temporary hoarseness is more frequently the result of some acute process in the pharynx or of great enervation. It may be worth while remarking here that laryngeal tuberculosis is not necessarily accompanied by hoarseness, and that the record of the number of cases with per-

sistent hoarseness here given in no sense indicates the number of cases of laryngeal tuberculosis which came under observation. A separate report on laryngeal tuberculosis and also on conditions of the pharynx is made by one of our laryngologists.

During the current year, out of seven hundred and thirty-four cases 8.85% were recorded as having persistent hoarseness and 46.18% as having temporary hoarseness; and for four years, out of three thousand seven hundred and thirty-three cases 10.71% were recorded as having persistent hoarseness, and out of two thousand two hundred and seventy-four cases 47.49% were recorded as having temporary hoarseness.

A comparison of the percentage of cases with congested throats with the percentage of cases who had temporary hoarseness shows that the two are pretty nearly equal, both for the current year and for the entire period during which statistics have been taken. There is also, as will be seen, a very close relationship between the number of cases recorded as having had inflamed throats and those who had persistent hoarseness. This relationship is probably more than a coincidence, and to some extent indicates that the temporary hoarseness is due to a transient condition while the persistent hoarseness is due to a condition which implies injured tissue.

There is a very close relationship between tuberculosis of the lungs and disturbance of the alimentary canal, and the two conditions have a mutual bearing one upon the other. This relationship, however, is largely nervous in character, depending upon a common nerve-supply to the respiratory tract and the upper end of the alimentary canal, and a very close affiliation of these two departments of economy through the sympathetic nervous system.

Disease of the lungs or of any part of the respiratory tract can undoubtedly interfere with the functions of the alimentary canal through nervous inhibition or over-stimulation without setting up any organic lesions in the alimentary canal of any kind whatso-

ever. On the other hand, when there is an organic lesion in the lungs or in any part of the respiratory tract functional disturbances or organic lesions of the alimentary canal may aggravate the process in the respiratory tract. Clinically we find that improvement in the condition of the lungs or recrudescence in the disease of the lungs goes hand in hand with good or bad function of the alimentary canal.

DISTURBANCE OF THE ALIMENTARY CANAL.

New cases,.....	Who were recorded as having had the tongue,.....	Coated,.....	475	Out of 734 cases
		Clean,.....	223	
		No record,... .	36	
		Dry,.....	53	
		Moist,.....	423	
		No record, ...	258	
	Who were recorded as having had, ...	Appetite,.....	363	Out of 734 cases
		No appetite,...	368	
		No record, ...	3	
	Who were recorded as having had, ...	Gastric disturbance,.....	405	Out of 734 cases
		Constipation,..	209	Out of 734 cases
		Diarrhea,.....	98	
Summary for three years,.....	Who were recorded as having had the tongue,.....	Coated,.....	1387	Out of 2274 cases
		Clean,.....	708	
		No record,....	179	
		Dry,.....	134	
		Moist,.....	943	
		No record, ...	1197	
	Who were recorded as having had, ...	Appetite,.....	1187	Out of 2274 cases
		No appetite,...	1042	
		No record,... .	45	
	Who were recorded as having had, ...	Gastric disturbance,.....	1196	Out of 2274 cases
		Constipation,..	721	Out of 2274 cases
		Diarrhea,*	274	

The table here given records the condition of patients when they have applied for treatment, and is therefore only of value in studying the conditions which lead a person to that state of depression in physical health which brings him to a physician or institution in search of aid.

* There was a record made for four years on patients who had "Diarrhea," the total being 432 out of 3733 cases.

For the current year, of the patients who applied for treatment and about whom a record was made as to coated tongue 68.05% had a coated tongue and 31.94% had a clean tongue. For the four years, of the patients who applied for treatment and about whom a record was made in this regard 66.20% had a coated tongue and 33.79% had a clean tongue. In the matter of dryness and moisture of the tongue, of those of whom a record was made for the current year 11.13% were recorded as having the tongue dry and 88.86% as having it moist. For the four years, of those of whom a record was made in this regard 12.44% were recorded as having the tongue dry and 87.55% as having it moist. Of the patients about whom a record was made during the current year in regard to appetite 49.65% were recorded as having appetite and 50.34% as not having appetite. For the three years, of those of whom a record was made 53.25% were recorded as having appetite and 46.74% as not having appetite. For the current year 55.17% of the patients were recorded as having gastric disturbance; 28.47% as suffering from constipation; and 13.35% as having diarrhea. For the three years 52.59% were recorded as suffering from gastric disturbance; 31.70% as suffering from constipation, and during the four years for which a record was taken as to diarrhea 11.57% were recorded as having diarrhea. All of these conditions were the conditions when the patients applied to the Institute for treatment and do not indicate subsequent developments.

A strange feature of tuberculosis which crops out clinically is that in spite of functional disturbances of the alimentary canal a large amount of food may be given, with the result of improvement in nutrition. A patient may vomit daily, be nauseated a great deal, and have looseness of the bowels, yet if he has the courage to take the food and takes a large amount of it, he will gain weight and apparently improve in physical health. This is a practical point well worth keeping in mind in the treatment of tuberculosis.

CONDITION OF THE LIVER.

Patients recorded as having had,....	Liver enlarged,.....	83	734 new cases
	Liver not enlarged,.....	296	
	No record of liver, ...	355	
Patients recorded as having had,....	Liver enlarged,.....	119	1389, summary for two years
	Liver not enlarged, ...	452	
	No record of liver, ...	818	

No record for first two years.

SPLEEN.

Patients recorded as having had,....	Spleen palpable,.....	74	734 new cases
	Spleen not palpable, ...	630	
	No record of spleen, ...	30	
Patients recorded as having had,....	Spleen palpable,.....	102	1389, summary for two years
	Spleen not palpable, ...	1190	
	No record of spleen, ...	97	

No record for first two years.

With the progress of tuberculosis the organs of the body become implicated in the process one after another, either by direct extension of the disease to those organs or by damage from toxemia. The liver and the spleen frequently become involved in both ways. For the current year the liver was recorded as enlarged clinically in 21.89% of the cases on which a record was made and in the summary for two years in 20.84% of the cases on which a record was made. The spleen was recorded as being palpable in 10.51% of the cases on which a record was made during the current year and in 7.89% of the cases on which a record was made for two years. As with the records of tissue involved, these records of the condition of the liver and spleen are purely clinical records and must be accepted as such. Enlargements of the liver and spleen are not easily made out clinically unless the enlargement is considerable, and mistakes in making records of this kind can easily occur. The figures here given, however, give a fair indication of what can be determined clinically in cases of this kind.

Comparison of the clinical tables on the condition of the liver and spleen with the pathological report of the condition of these organs when cases come to autopsy would seem to indicate that

these organs are oftener enlarged than is made out at the bedside. The enlargement, however, frequently is of a character which one would scarcely expect to make out clinically.

DISTURBANCES OF THE TEMPERATURE, PULSE, AND RESPIRATION.

New cases, ..	Who were recorded as having had chills at one time or another,		335	Out of 734 cases
	Whose temperature when taken,	Was below 100°,	350	734
		Was 100° and over,	354	
		No record,	30	
	Whose pulse when taken,	Was below 100,	178	734
		Was 100 and over,	524	
		No record,	32	
	Whose respiration when taken,	Was below 30,	331	734
		Was 30 and over,	358	
		No record,	45	
	Who were recorded as having had shortness of breath,		597	Out of 734 cases
Summary for three years,	Who were recorded as having had chills at one time or another,		1027	Out of 2274 cases
	Whose temperature when taken,	Was below 100°,	1227	2274
		Was 100° and over,	924	
		No record,	123	
	Whose pulse when taken,	Was below 100,	818	2274
		Was 100 and over,	1329	
		No record,	127	
	Whose respiration when taken,	Was below 30,	1185	2274
		Was 30 and over,	856	
		No record,	233	
	Who were recorded as having had shortness of breath,		1833	Out of 2274 cases

No record on first year's cases.

RESULTS OF TREATMENT IN PATIENTS WITH PULSE ABOVE AND BELOW 100.

Number of patients, ..	Disease arrested,	3	Out of 178 whose pulse was below 100
	Improved,	72	
	Unimproved,	42	
	Died,	3	
	Made only one visit,	58	
Number of patients, ..	Disease arrested,	4	Out of 524 whose pulse was 100 or over
	Improved,	186	
	Unimproved,	211	
	Died,	66	
	Made only one visit,	57	

This table accounts for 702 cases only; the remaining 32 had no record of pulse.

RESULTS OF TREATMENT IN PATIENTS WITH RESPIRATIONS ABOVE AND BELOW 30.

Number of patients,..	Disease arrested,..... 5	Out of 331 whose respiration was below 30	
	Improved,.....142		
	Unimproved,..... 94		
	Died,..... 2		
	Made only one visit,..... 88		
Number of patients,..	Disease arrested,..... 2	Out of 358 whose respiration was 30 or over	
	Improved,.....118		
	Unimproved,.....153		
	Died,..... 66		
	Made only one visit,..... 19		

This table accounts for 689 cases only; the remaining 45 had no record of respiration.

Disturbances of temperature, pulse, and respiration in tuberculosis offer an excellent field for investigation. As yet we have very little definite knowledge about them other than that of their rate and variation. As to the cause of these disturbances and the relative variation of the temperature, pulse, and respiration from normal we have no definite knowledge. The subject is an exceedingly complicated one and difficult to elucidate.

The pulse-rate is apparently the most easily disturbed in tuberculosis and ranges furthest from the normal with the least provocation. Temperature in uncomplicated tuberculosis apparently does not ordinarily go far from the normal, and respiration, while nearly always disturbed, is relatively less disturbed than the other functions. When tuberculosis affects the lungs one would naturally expect a very serious disturbance of respiration on account of the mechanical interference which is set up by the infiltration, and yet, strange to say, the respiratory movement is not much accelerated.

For the current year, out of seven hundred and four cases upon which a record was made 49.71% had their temperature when taken below 100° and 50.28% had their temperature 100° or over. During the three years for which a record was taken on the temperature, out of two thousand one hundred and fifty-one cases

upon which a record was made 57.04% showed a range below 100° and 42.95% showed a range of 100° or over.

During the current year, out of seven hundred and two cases upon which a record was made as to the pulse, when taken it was below 100 in 25.35% and 100 or over in 74.64%. For the three years, out of two thousand one hundred and forty-seven cases upon which a record was made the pulse when taken was below 100 in 38.09% and 100 or over in 61.90%.

For the current year, out of six hundred and eighty-nine cases on which a record was made as to respiration the respirations when taken were below 30 in 48.04% and were 30 or over in 51.95%. For the three years, out of two thousand and forty-one cases on which a record was made as to respiration the respirations when taken were below 30 in 58.05% and 30 or or in 41.94%.

If a respiration of 30, a pulse-rate of 100, and a temperature of 100° represent about the same relative disturbance in tuberculosis,—this apparently being a fair ratio,—it will be seen that the percentage of cases which had a disturbance above this is much the highest in the pulse-rate; next highest in the temperature rate; and lowest in the respiratory rate. It also will be noted that the disturbance is greater in all three items for the current year than for the summary.

Chills are usually put down as an accompaniment of temperature disturbance, but, as a rule, they go only with a high temperature. Considering the relatively low temperature in tuberculosis, it is somewhat surprising to see the large percentage of cases, namely, 45.64%, which have at one time or another complained of chills. One may well raise the question here whether the sensation of chills in tuberculosis may not be due to some other cause than the tuberculous process. Clinically one is led to believe that chills are due to mixed infection.

Another rather surprising record in the table is that of shortness of breath. Although the percentage of cases which had

what might be considered a relatively high respiratory rate was rather low, the percentage of cases in which there was a sense of shortness of breath was very high, namely, 81.33%. It is evident that the respiratory movement does not always increase in ratio to the sense of want of oxygenation felt by a patient.

The picture of these various functional disturbances of respiration and circulation, with the subjective symptoms accompanying them, suggests the action of a toxin upon the nervous system and the blood-vessels as a cause. It, moreover, raises the question whether or not the disturbance in the respiratory function is brought about in the same way as the disturbance in the circulatory function. There seems to be an antithesis between them.

The results of treatment in patients with various pulse and respiratory rates are quite interesting. Of the patients with a pulse-rate below 100 who made more than one visit, 2.5% had the disease arrested; 60% were improved; 35% were unimproved; and 2.5% died. Of the patients with a pulse-rate of 100 or over who made more than one visit, .85% had the disease arrested; 39.82% were improved; 45.18% were unimproved; and 14.13% died.

Of the patients with a respiratory rate below 30 who made more than one visit, 2.05% had the disease arrested; 58.43% were improved; 38.68% were unimproved; and .82% died. Of the patients with a respiratory rate of 30 or over, .58% had the disease arrested; 34.80% were improved; 45.13% were unimproved; and 19.46% died.

It would appear from these tables that a respiratory rate of 30 and over is a more unfavorable prognostic sign than a pulse-rate of 100 and over. The results in patients with a pulse-rate below 100 were even better than the results in patients with a respiratory rate below 30.

The circulation plays an important part in tuberculosis and

therefore cannot be too closely studied in this disease. What part it plays in implantation has not yet been settled, although it is generally conceded that the tubercle bacillus may be carried to its place of implantation by the circulation. That tubercle bacilli circulate in the blood while the disease is in progress cannot be doubted, inasmuch as the bacilli are eliminated by the kidneys, as has been proved by Walsh. About the influence of the bacillus and its toxins upon the blood-vessels and heart muscle we as yet know very little. It is evident, however, from the tables here given that an influence of some kind is exercised upon the circulatory system, either directly upon the tissues of the vessels themselves or indirectly through the nervous system.

DISEASES OF THE CIRCULATORY SYSTEM.

New cases, 734,	Number of cases with circulatory disturbance,	674	Aortic stenosis, 8
			Pulmonic stenosis, 2
			Mitral stenosis, 4
			Mitral regurgitation, 15
			Mitral stenosis and regurgitation, 3
			Dilated right heart, 80
			Arteriosclerosis, 127
			Accentuated aortic second sound, 222
			Accentuated pulmonic second sound, 455
	Number of cases without circulatory disturbance,	51	
	No record,	9	
Summary for three years, 2274,	Number of cases with circulatory disturbance,	1732	Aortic stenosis, 18
			Aortic regurgitation, 7
			Mitral stenosis, 20
			Mitral regurgitation, 66
			Mitral stenosis and regurgitation, 7
			Mitral and aortic regurgitation and aortic stenosis, 2
			Mitral and aortic stenosis and regurgitation, 1
			Dilated right heart, 214
			Arteriosclerosis, 311
			Accentuated aortic second sound, 603
			Accentuated pulmonic second sound, 1119
	Number of cases without circulatory disturbance,	484	
	No record,	58	

THE CIRCULATORY SYSTEM IN DETAIL.

Accentuation of second sounds,.....	Aortic accentuated,.....	222	732 * new cases
	Aortic not accentuated,.....	497	
	No record of aortic,.....	13	
	Pulmonic accentuated,.....	455	732 * new cases
	Pulmonic not accentuated,.....	263	
	No record of pulmonic,.....	14	
	Both sounds accentuated,.....	164	Out of 732 * new cases
Reduplication,.....	Mitral first,.....	15	732 * new cases
	Pulmonic second,.....	35	
	Aortic second,.....	2	
	None,.....	670	
	No record,.....	10	
Organic murmurs,..	Presystolic mitral,.....	4	732 * new cases
	Systolic mitral,.....	15	
	Double mitral,.....	3	
	Systolic aortic,.....	8	
	Systolic pulmonic,.....	2	
	None,.....	691	
	No record,.....	9	
Functional murmurs,.....	Systolic at apex,.....	19	732 * new cases
	Systolic at base of heart,.....	4	
	Soft systolic at pulmonic area,.....	11	
	None,.....	689	
	No record,.....	9	
Apex beat,.....	4th interspace inside mid-clavicular line,.....	62	732 * new cases
	4th interspace outside mid-clavicular line,.....	3	
	5th interspace inside mid-clavicular line,.....	611	
	5th interspace outside mid-clavicular line,.....	10	
	5th interspace anterior axillary line,..	3	
	6th interspace inside mid-clavicular line,.....	21	
	6th interspace outside mid-clavicular line,.....	3	
	No record,.....	19	
Upper border,.....	Third rib,.....	477	732 * new cases
	Fourth rib,.....	169	
	Second rib,.....	55	
	No record,.....	31	
Right border,.....	Right border of sternum,.....	219	732 * new cases
	One-half inch beyond right of sternum,.....	80	
	Mid-sternum,.....	166	
	Left border of sternum,.....	240	
	No record,.....	27	

* A record is given on 732 cases only. Two cases with displacement of heart to right are reported on separately.

THE CIRCULATORY SYSTEM IN DETAIL.—(*Continued.*)

Arteriosclerosis,	Slight,	50	732 * new cases
	Moderate,	64	
	Marked,	11	
	None,	598	
	No record,	9	
Cardiac rhythm,	Normal,	685	732 * new cases
	Irregular,	24	
	No record,	23	
Thrills,	At apex,	16	732 * new cases
	Over pulmonic area,	3	
	Over heart generally,	3	
	None,	698	
	No record,	12	
Pulse, Volume,	Normal,	352	732 * new cases
	Small,	297	
	Large,	75	
	No record,	8	
Pulse, Tension,	Normal,	243	732 * new cases
	High,	175	
	Low,	302	
	No record,	12	
Accentuation of second sounds,	Aortic accentuated,	409	1384, summary for two years
	Aortic not accentuated,	924	
	No record of aortic,	51	
	Pulmonic accentuated,	798	1384, summary for two years
	Pulmonic not accentuated,	544	
	No record of pulmonic,	42	
	Both sounds accentuated,	279	Out of 1384 cases
Reduplication,	Mitral first,	42	1384, summary for two years
	Pulmonic second,	51	
	Aortic second,	2	
	None,	1250	
	No record,	39	
Organic murmurs,	Presystolic mitral,	6	1384, summary for two years
	Systolic mitral,	39	
	Double mitral,	7	
	Systolic mitral and double aortic,	2	
	Double mitral and double aortic,	1	
	Systolic aortic,	10	
	Systolic pulmonic,	3	
	None,	1294	
	No record,	22	
Functional murmurs,	Systolic at apex,	26	1384, summary for two years
	Systolic at base of heart,	7	
	Soft systolic at pulmonic area,	17	
	Harsh at pulmonic area,	1	
	None,	1311	
	No record,	22	

* A record is given on 732 cases only. Two cases with displacement of heart to right are reported on separately.

THE CIRCULATORY SYSTEM IN DETAIL.—(*Continued.*)

Apex beat,	4th interspace inside mid-clavicular line,	116	1384, summary for two years
	4th interspace outside mid-clavicular line,	3	
	5th interspace inside mid-clavicular line,	1139	
	5th interspace outside mid-clavicular line,	26	
	5th interspace, anterior axillary line,	9	
	5th interspace, mid-axillary line,	2	
	6th interspace inside mid-clavicular line,	31	
	6th interspace outside mid-clavicular line,	13	
	Not recorded,	45	
Upper border,	Third rib,	900	1384, summary for two years
	Fourth rib,	339	
	Second rib,	84	
	No record,	61	
Right border,	Right border of sternum,	374	1384, summary for two years
	One-half inch beyond right of sternum,	158	
	Mid-sternum,	320	
	Left border of sternum,	470	
	No record,	62	
Arteriosclerosis,	Slight,	122	1384, summary for two years
	Moderate,	125	
	Marked,	32	
	None,	1042	
	No record,	63	
Cardiac rhythm,	Normal,	1293	1384, summary for two years
	Irregular,	51	
	No record,	40	
Thrills,	At apex,	33	1384, summary for two years
	Over pulmonic area,	3	
	Over heart generally,	10	
	None,	1308	
	No record,	30	
Pulse, — Volume,	Normal,	705	1384, summary for two years
	Small,	509	
	Large,	145	
	No record,	25	
Pulse, — Tension,	Normal,	520	1384, summary for two years
	High,	299	
	Low,	541	
	No record,	24	

No record for first two years.

During the current year, out of seven hundred and twenty-five cases on which a record was made 92.96% were recorded as having had some circulatory disturbance and 7.03% as not having had any.

In the summary for three years, out of two thousand two hundred and sixteen cases on which a record was made 78.15% were recorded as having had circulatory disturbance and 21.84% as not having had any. The percentage is larger for the current year than for the three years because with increased experience the staff has made more careful and more accurate observations.

DISPLACEMENT OF THE HEART.

No. 4702.—Dr. Ravenel.

Accentuated second sound,	Aortic	No
	Pulmonic	No
Reduplication		No
Murmurs	Functional	No
	Organic	No
Arteriosclerosis	Slight	No
	Moderate	No
	Marked	Yes
Apex beat		5th space on right side, nipple line
Upper border		3d space
Right border		About nipple line
Cardiac rhythm		Regular
Thrills		On right side below nipple
Pulse	Volume	Large
	Tension	High
Cause of displacement		Fibrosis of right lung

No. 4735.—Dr. McCarthy.

Accentuated second sound,	Aortic	Yes
	Pulmonic	No
Reduplication		Not recorded
Murmurs	Functional	No
	Organic	No
Arteriosclerosis	Slight	No
	Moderate	Yes
	Marked	No
Apex beat		None distinct—impulse diffuse over right lower chest to nipple line on right
Upper border		3d rib (right)
Right border		Nipple line on right side
Cardiac rhythm		Regular
Thrills		None
Pulse	Volume	Normal
	Tension	High
Cause of displacement		Pneumothorax on left

URINARY ABNORMALITIES.

New cases, 734,.....	Recorded as having had urine examined,..... 513	Sugar,..... 0	
		Albumin,.....168	
		Casts,.....138	
		Diazo,..... 32	
		Specific gravity below 1018,.....145	
		Specific gravity 1018 or above,.....307	
		No record of specific gravity,..... 61	
	With no record of having had urine examined,.... 221		
Summary for four years, 3733,.....	Recorded as having had urine examined,.....1548	Sugar,..... 17	
		Albumin,.....437	
		Casts,.....189	
		Diazo,.....140	
		Specific gravity below 1018,.....223	
		Specific gravity 1018 or above,.....589	
		No record of specific gravity,..... 80	
	With no record of having had urine examined,....2185		

No special record on specific gravity in the first two years. No special record on casts and diazo in the first year. In the summary, therefore, the figures on casts and diazo are from 1387 examinations; those on specific gravity from 892 examinations.

EDEMA.

Number of cases recorded as having had edema,.....	New cases,.....	106,	Out of 734 cases
	Summary for four years, .	615,	Out of 3733 cases

The evidence of circulatory disturbance recorded in the largest number of cases is accentuation of the pulmonic second sound. During the current year, out of seven hundred and eighteen cases on which a record was made as to pulmonary second sound 63.37% were recorded as having the second sound accentuated and 36.62% as not having it. In the summary for two years, out of one thousand three hundred and forty-two cases for which a record was made as to the pulmonic second sound 59.46% were recorded as having the second sound accentuated and 40.53% as not having it. Here again the number of cases is larger for the current year than for the two years, and probably for the same reason as with the disturbance of the circulatory system, namely, that with greater experience the staff has made more accurate records.

Next to the accentuation of the pulmonic second sound the most frequent evidence of disturbed circulation is the accentuation of the aortic second sound. For the current year, out of seven hundred and nineteen cases on which a record was made as to aortic second sound 30.87% were recorded as having the aortic second sound accentuated and 69.12% as not having it. For the two years, out of one thousand three hundred and thirty-three cases on which a record was made 30.68% were recorded as having the aortic second sound accentuated and 69.31% as not having it. Accentuation of the aortic second sound occurred only about one-half as often as accentuation of the pulmonic second sound. In two hundred and seventy-nine cases out of the one thousand three hundred and eighty-four, or 20.15% of the total number of cases, accentuation occurred with both sounds.

What accentuation of the second sound of the heart in tuberculosis means has not been definitely worked out, but it is not difficult to formulate reasonable hypotheses. We have much reason for believing that accentuation of the pulmonic second sound indicates an unusual burden on the pulmonic circulation, and that accentuation of the aortic second sound is evidence of an unusual burden on the excretory organs, especially the kidneys. Accentuation of the pulmonic second sound makes its appearance early in the disease and is most evident during the time of activity of the pulmonic lesion; whereas accentuation of the aortic second sound seems to occur more frequently in the more advanced stages of the disease when time has permitted damage to other organs of the body through secondary intoxication.

The next most frequent evidence of disturbed circulation is to be found in the pulse. The pulse is practically always accelerated in tuberculosis, but in addition to acceleration it shows other deviations from the normal. These deviations manifest themselves principally in the volume of the pulse and in the tension. For the current year, out of seven hundred and twenty-four cases on which a record was taken as to volume 48.62% were recorded

as normal, 41.02% as small, and 10.35% as large. For two years, out of one thousand three hundred and fifty-nine cases on which a record was taken as to volume 51.88% were recorded as normal, 37.45% as small, and 10.66% as large. As to tension, during the current year out of seven hundred and twenty cases on which a record was made 33.75% were recorded as normal, 24.30% as high, and 41.94% as low. For two years, out of thirteen hundred and sixty cases on which a record was made 38.23% were recorded as normal, 21.98% as high, and 39.78% as low.

In placing value on the statistics here given one should keep in mind that the statistics were taken by men who had no accurate standard to go by and were therefore bound to vary in their judgments as to what would constitute a normal pulse and what would be a deviation. It is quite conceivable that what one man would record as a normal pulse another might readily record as an abnormal one. It is sometimes exceedingly difficult to determine by the finger the volume and tension of the pulse, particularly as to its variation from the normal.

A comparison of the tables on the second sound with the tables on the pulse shows a certain amount of harmony between the normal pulmonic second sound and the normal tension of the pulse, and between the normal aortic second sound and the normal volume of the pulse. Out of one thousand three hundred and forty-two cases 40.53% were recorded as having the pulmonic second sound normal, and out of thirteen hundred and sixty cases 38.23% were recorded as having the tension normal. Out of one thousand three hundred and thirty-three cases 69.31% were recorded as having the aortic second sound normal, and out of one thousand three hundred and fifty-nine cases 51.88% were recorded as having the volume of the pulse normal.. Whether this apparent harmony means anything remains to be determined by more accurate observations.

Arteriosclerosis apparently occurs more frequently in tuberculosis than in the average individual, and may perhaps be one of

the results of the damaging influence of the toxin of the tubercle bacillus. For the current year, out of seven hundred and twenty-five cases arteriosclerosis was recorded in 17.51%; for two years, out of one thousand three hundred and twenty-one cases it was recorded in 21.12%; and for three years, out of two thousand two hundred and sixteen cases it was recorded in 14.03%. It must be borne in mind that these are what might be termed finger records only, and are not mathematically correct.

The evidences of disturbance of the circulatory system which might be called mechanical, such as murmurs, disease of the valves, dilated heart, and displacement, were not recorded in a very large number of cases, as the table shows. For the current year, dilated right heart is by far the most frequent mechanical damage recorded, and is set down as having occurred in eighty out of six hundred and seventy-four cases, or 11.86%; and in the summary for the three years the same injury is put down as having occurred in two hundred and fourteen out of one thousand seven hundred and thirty-two cases, or 12.35%. The next most frequent injury is mitral regurgitation, which is recorded as having occurred in fifteen out of six hundred and seventy-four cases, or 2.22% for the current year, and in sixty-six out of one thousand seven hundred and thirty-two cases, or 3.81%, in the summary for the three years.

As would be expected, displacement of the heart from its normal position occurs quite frequently in tuberculosis, but this displacement is rarely a serious matter, as is shown by the table. In exceptional cases the displacement is completely out of the normal position and becomes a serious complication. A detailed description of two such cases is given and the cause of the displacement in each of these cases is recorded in the description.

There is a close relationship between circulatory disturbances and urinary abnormalities and also between circulatory disturbances and edema. Kidney insufficiency is apt to follow interference with the circulation, and interference with the circu-

lation together with kidney insufficiency ultimately lead to edema. Urinary abnormalities, however, also depend on changes in the kidneys themselves, and these go hand in hand with changes in the blood-vessels. Changes in the kidneys do not always give rise to urinary abnormalities, and it is quite possible that the urinary abnormalities recorded in the tables are more the result of interference with the circulation than of kidney changes.

The most frequent urinary abnormality recorded is the presence of albumin in the urine. For the current year, out of five hundred and thirteen cases in which the urine was examined 32.74% showed the presence of albumin; and in the summary for four years, out of one thousand five hundred and forty-eight cases in which the urine was examined 28.23% showed the presence of albumin. The percentage of cases which showed albumin is considerably larger during the current year than during the four years, and this is probably due to more accurate tests for albumin, as with the growth of our experience the urinary examinations are better made.

The next most frequent urinary abnormality is low specific gravity. Out of five hundred and thirteen cases during the current year, 28.26% showed a specific gravity below 1018; and for the four years, out of one thousand five hundred and forty-eight cases 14.40% showed specific gravity below 1018. The percentage of low specific gravity for the current year is nearly twice that for the four years, this gain being due, no doubt, to more accurate and careful urinary examinations.

Casts stand third in the list of urinary abnormalities. During the current year, out of five hundred and thirteen cases they occurred in 26.90%; and for the four years, out of one thousand five hundred and forty-eight cases they occurred in 12.20%. The finding of casts in the urine depends very much upon centrifugalization and the amount of urine examined. More recently examinations of urine have been much more thorough than in

former years, which accounts for the large relative increase in the number of cases with casts.

During the current year, out of seven hundred and thirty-four cases 14.44% were recorded as having had edema; and for the four years, out of three thousand seven hundred and thirty-three cases 16.47% were recorded as having had edema. The record of edema is not very accurate, as all cases were not examined with equal care and different men vary somewhat in their ideas as to what constitutes edema. It may, however, be accepted as approximately correct.

For the four years there is pretty close harmony between the percentage of cases which had low specific gravity, the percentage of cases which had casts, and the percentage of cases which had edema; 14.40% had low specific gravity, 12.20% had casts, and 16.47% had edema. During the current year the percentage of cases with casts was just about twice the percentage of cases with edema; but for the four years the percentage of cases with casts was below the percentage of cases with edema. There is an evident inconsistency in these figures, probably due to the defects in the records.

PAIN.

Number of patients who at one time or another suffered pain,.....	New cases,.....	588,	Out of 734 cases
	Summary for three years,	.1680,	Out of 2274 cases

No record on first year's cases.

NIGHT-SWEATS.

Number of patients who had night-sweats at one time or another,...	New cases,.....	477,	Out of 734 cases
	Summary for four years,	..2293,	Out of 3733 cases

HEMOPTYSIS.

Number of patients who had hemoptysis at one time or another, ..	New cases,.....	379,	Out of 734 cases
	Summary for four years,	.1838,	Out of 3733 cases

PUPILS.

Number of patients who had	Pupils dilated,..... 170			New cases
	Pupils not dilated,..... 552			
	No record of condition of pupils,..... 12	734		
	Pupils unequal,..... 31			
	Pupils equal,..... 688	734		
	No record of equality,..... 15			
Number of patients who had	Pupils dilated,..... 513			Summary for four years
	Pupils not dilated,.....1197			
	No record of condition of pupils,.....2023	3733		
	Pupils unequal,..... 100			
	Pupils equal,.....1862	3733		
	No record of equality,.....1771			

Large number of "no records" due to fact that no detailed record was made during most of first year.

There are certain symptoms and conditions in tuberculosis which in a measure may be termed incidental in that they are in all probability not altogether due to the tubercle bacillus itself, but in part or in whole to fraternizing micro-organisms. Among these are pain, night-sweats, hemoptysis, and dilated pupils.

Pain is one of the most common symptoms of tuberculosis, standing next to cough in frequency. For the current year, out of seven hundred and thirty-four cases it occurred in 80.10%; and for three years, out of two thousand two hundred and seventy-four cases it occurred in 73.87%. It stands ahead of emaciation, which is looked upon as a very common symptom in tuberculosis. Of course, pain is a very common occurrence with most people at one time or another, and it is quite possible that the pain which is recorded by the tuberculous patient may often have nothing at all to do with his disease. On the other hand, the pain recorded is a symptom elicited by the physician with the idea in mind of its having a bearing upon the tuberculous process, and for this reason in all probability represents largely the pain which has been engendered directly or indirectly by the process of disease.

The cause of pain in tuberculosis is a difficult thing to make

out. In many instances it is due to a pleurisy of either a subacute or chronic character, but in a larger number of cases it probably is due to a neuritis set up by a toxin of some kind. As pain rarely occurs in the very early stages of the disease when the system is poisoned with the tuberculous toxin alone, and since it occurs very frequently in the more advanced stages of mixed infection, there is some reason to believe that it may be due to the toxemia of the associated micro-organisms. This is a matter which cannot be cleared up until we know more about the symptoms set up by the toxins of the various micro-organisms with which we have to deal.

Night-sweats occurred at one time or another in 65% of seven hundred and thirty-four cases during the current year; and in 61.42% of three thousand seven hundred and thirty-three cases during the four years. This is a very high frequency when one considers how easily night-sweats can be avoided in tuberculosis. It implies an improper mode of life and incorrect diet with most people who have tuberculosis, since night-sweats almost invariably stop as soon as a patient is placed at rest in a well aired room and given the proper things to eat. In a measure it shows how far from the goal we are in the matter of public education as regards the proper management of persons suffering from tuberculosis.

We do not know the cause of night-sweats, but we have reason to believe that it is a toxin of a micro-organism which has to do with softening and the breaking down of tissue. For the present we hold the streptococcus and staphylococcus largely responsible for the production of this symptom, although this responsibility has not yet been demonstrated. There undoubtedly is a secondary metabolic cause for night-sweats, even if the streptococcus and staphylococcus are the main cause, and the problem of working it out is one for the physiological chemist as well as for the bacteriologist.

Hemoptysis occurred in 51.63% of seven hundred and thirty-four cases during the current year, and in 49.20% of three thou-

sand seven hundred and thirty-three cases during the four years. The frequency of this symptom is surprising and greatly exceeds the expectations of clinical experience. Behind it are hidden interesting facts which when fully worked out will throw new light upon the treatment of the disease and will make that treatment easier. There are good reasons for believing that hemoptysis is usually due to associated micro-organisms and not to the tubercle bacillus itself. This has not yet been proved, but the work which has been done at the Institute on the problem points to this conclusion.

Aside from the definite information which we have upon the relationship of associate micro-organisms to hemoptysis, we have some side-lights upon the subject, such as, for example, the frequency with which hemoptysis is followed by pneumonia and by destructive processes. In taking histories we often find that up to the time of hemoptysis the patient was free from symptoms, although he had had tuberculosis for a long time, and that the hemoptysis was ushered in by what the patient terms a cold. If we see the patient at the time of the first hemorrhage we usually find him suffering from an acute process with involvement of the mucous membrane of the upper respiratory tract and sometimes with a fully developed pneumonia. This acute condition in no way corresponds to the process which we know as tuberculosis.

Dilated pupils were recorded for the current year in 23.54% of seven hundred and twenty-two cases on which a record was made, and unequal pupils in 4.31% of seven hundred and nineteen cases on which a record was made. For the four years, dilated pupils were recorded in 30% of one thousand seven hundred and ten cases on which a record was made, and unequal pupils in 5.09% of one thousand nine hundred and sixty-two cases on which a record was made.

It is usually assumed that there is a causal relationship between tuberculosis and dilated pupils and between tuberculosis and unequal pupils. The statistics here given would seem to

indicate that this assumption is unwarranted. If tuberculosis in itself were the cause of dilated and of unequal pupils, these phenomena ought to occur in a much larger percentage of cases. It would seem more probable that the change in the pupils is either an incident in the general muscular weakness or is the result of a toxemia set up by some other organism than the tubercle bacillus.

MENSTRUATION AND LEUCORRHEA.

New cases, ..	Women who were recorded as.....	Menstruating,.....157		Out of 291 females
		Menstruation stopped by illness,..... 76		
		No record,..... .. 58		
	Women who were recorded as having had.....	Leucorrhea,.....123		Out of 291 females
Summary for two years, .	Women who were recorded as.....	Menstruating,.....322		Out of 579 females
		Menstruation stopped by illness,.....172		
		No record,..... 85		
	Women who were recorded as having had.....	Leucorrhea,.....265		Out of 579 females

No record for first two years. The "no records" in the last two years refer almost entirely to cases of menopause and children.

There is a popular idea that cessation of menstruation and occurrence of leucorrhea are either forerunners of consumption or forebode evil when consumption already exists. This idea is evidently based upon incorrect interpretation of certain observations made by the people, but contains a modicum of truth. Cessation of menstruation in a tuberculous woman who has not reached the menopause may mean either an advanced stage of the disease or a severe attack, and it may mean nothing of importance. It does not occur in all advanced cases nor in all severe cases, but it occurs often enough in either type to attract popular attention. In our statistics for the year it occurred in 32.61% of two hundred and thirty-three cases upon which a record was made, and for two years it occurred in 34.81% of four hundred and ninety-four cases upon which a record was made.

In 67.38% of two hundred and thirty-three cases upon which a record was made for the current year menstruation continued; and in 65.18% of four hundred and ninety-four cases for the two years it continued. Thus it will be seen that while menstruation was not interfered with in nearly two-thirds of the cases, it was interfered with in a large enough number to attract attention. Stoppage of menstruation is due in most instances to excessive drainage of the organism by the disease, and is a benefit instead of an injury. As soon as the individual is restored to a fair condition of nutrition menstruation returns. In some cases, however, stoppage seems to be due to intense toxemia and consequent nervous disturbance, and in such cases a fatal termination is usually reached without recurrence of the menstrual period. In these cases there seems to be a profound disturbance of the entire mechanism of the body with serious blood changes.

Out of two hundred and ninety-one females who were treated during the current year 42.26% were recorded as having had leucorrhea, and out of five hundred and seventy-nine females treated during two years 45.76% were recorded as having had leucorrhea. There is an old popular notion that leucorrhea is in some way associated with decline. This undoubtedly is erroneous, and yet there may be a slight foundation for it. Tuberculosis of the female reproductive organs does not occur frequently enough to account for the large number of tuberculous females who have leucorrhea. The symptom, therefore, cannot always be due to the disease directly. It is quite possible that the general relaxation of the body and the malnutrition which are so frequently associated with tuberculosis may cause the leucorrhea. Just what such a drain as leucorrhea sets up may do in the way of keeping down a tuberculous subject and interfering with recovery is a problem which yet remains to be worked out. Usually improvement in the general health of the consumptive who is suffering from leucorrhea brings with it an improvement in the leucorrhea.

FREEDOM FROM COUGH.

New cases,.....	Tuberculous,.....	26	Out of 945 cases
	Non-tuberculous,.....	17	
Summary for four years,.....	Tuberculous,.....	138	Out of 4831 cases
	Non-tuberculous,.....	78	

The Phipps Institute being an institution for the treatment of tuberculosis, people who apply for treatment are under the impression that they have the disease or at least suspect that they have it. Most of them come because they have a cough. Out of nine hundred and forty-five persons who applied for treatment during the year, only forty-three, or 4.55%, were free from cough; and out of four thousand eight hundred and thirty-one persons who applied for treatment during a period of four years, only two hundred and sixteen, or 4.47%, were free from cough. Strange to say, the majority of those who were free from cough had tuberculosis; although the percentage of non-tuberculous who were free from cough is greater than the percentage of tuberculous. Of the three thousand seven hundred and thirty-three tuberculous patients who applied for treatment 3.69% were free from cough, and of the one thousand and ninety-eight non-tuberculous, unsuitable, and undiagnosed applicants 7.1% were free from cough. Cough in tuberculous as in non-tuberculous conditions is very often due to diseases of the mucous membrane of the respiratory tract, and no doubt many of the coughs which brought patients to the Institute were due to colds of one kind or another and were not dependent to any great degree upon the tuberculous process.

The complications recorded in the tables are those which were in evidence during the time of treatment. Relatively few patients are under observation during the entire time of the disease, hence the complications recorded can in no sense be accepted as indicating the frequency of those complications. Pneumonia, for instance, occurs much more frequently in tuberculosis than one would be led to believe from the figures here given. Pneumonia

in some form, indeed, is a very frequent complication and is probably one of the most serious impediments in the way of recovery from tuberculosis. Pneumonia occurring in an advanced case of tuberculosis can easily be overlooked.

COMPLICATIONS.

Pneumothorax	4	Out of 734 new cases
Hernia	6	
Fistula in ano	4	
Movable kidney	2	
Pneumonia	6	
Syphilis	3	
Bronchiectasis	1	
Pleural effusion, R	2	
Pleural effusion, L	10	
Pneumothorax	9	Out of 1389, summary for two years
Hernia	8	
Fistula in ano	5	
Movable kidney	3	
Pneumonia	6	
Syphilis	6	
Bronchiectasis	2	
Pericarditis	1	
Pleural effusion, R	7	
Pleural effusion, L	11	

No record for first two years.

THYROID.

Patients recorded as having had	Thyroid enlarged	59	734 new cases
	Thyroid not enlarged	623	
	No record of thyroid	52	
Patients recorded as having had	Thyroid enlarged	94	1389, summary for two years
	Thyroid not enlarged	1241	
	No record of thyroid	54	

No record for first two years.

Enlarged thyroid may be set down as a complication in tuberculosis, although its relationship is not understood. In a certain number of cases the thyroid is tuberculous and it is suspected that in a certain number of other cases the enlargement is in some way associated with a disturbance in the circulation. The probabilities are that in some cases at least it is a mere coincidence. It occurs much more frequently according to the tables than any other complication recorded, having occurred in 8.65% of the cases for the current year and in 7.04% of the cases for two years.

AID GIVEN.

New cases, ..	Number of quarts of milk given in dispensary,	127,977	Out of 612 dispensary cases
	Number of patients to whom milk was given in dispensary,	322	
	Average daily amount of milk to patients who received milk in dispensary,	2.53 quarts	
	Average daily amount of milk given on total number of patients treated in dispensary,	.58 quarts	
	Number of patients to whom preventive measure supplies were given,	612	
Summary for two years, .	Number of quarts of milk given in dispensary,	273,445	Out of 1163 dispensary cases
	Number of patients to whom milk was given in dispensary,	542	
	Average daily amount of milk to patients who received milk in dispensary,	2.55 quarts	
	Average daily amount of milk given on total number of patients treated in dispensary,	.64 quarts	
	Number of patients to whom preventive measure supplies were given,	1091	
Summary for three years,	Number of patients who received milk,	940	Out of 2274 dispensary cases
	Who received preventive measure supplies,	1687	

INSPECTIONS.

734 new cases,	Number of patients inspected once,	127	Total number of inspections, 740 Average number of inspections, 1.93	Out of 383 cases inspected
	Number of patients inspected more than once,	256		
	No record of inspection,	351		
1389, summary for two years, .	Number of patients inspected once,	256	Total number of inspections, 2087 Average number of inspections, 2.62	Out of 794 cases inspected
	Number of patients inspected more than once,	538		
	No record of inspection,	595		

No record for first two years

OBSERVANCE OF RULES.

New cases,	Number of patients inspected, 383,	Who observed rules well,	160	383
		Who observed rules fairly well,	26	
		Who did not observe rules,	10	
		Of whose observance of rules no record was made,	187	
Summary for three years,	Number of patients inspected. 1056,	Who observed rules well,	598	1056
		Who observed rules fairly well,	167	
		Who did not observe rules,	49	
		Of whose observance of rules no record was made,	242	

No record made first year.

WEIGHT.

New cases,

- Number of patients treated,..... 734 — Weighed,.....705; Not weighed, . 29
- Number of patients treated in dispensary,..... 612 — Weighed,.....598; Not weighed, . 14
  - Dispensary only, .. 564
  - Dispensary and hospital,..... 48
- Number of patients treated in hospital, 170 — Weighed,.....155; Not weighed, . 15
  - Hospital only,..... 122
  - Hospital and dispensary,..... 48
- Number of patients weighed in dispensary,.....598
  - Gained,..... 250 — Total gain,.....1378.88; Average gain,..... 5.51
  - Lost,..... 171 — Total loss,..... 646.50; Average loss, ... 3.77
  - No change recorded,..... 177
- Number of patients weighed in hospital,.....155
  - Gained,..... 73 — Total gain,..... 647.00; Average gain,..... 8.86
  - Lost,..... 56 — Total loss,..... 299.50; Average loss, ... 5.34
  - No change recorded,..... 26

Summary for four years,..

- Number of patients treated,.....3733 — Weighed, ...3485; Not weighed, 248
- Number of patients treated in dispensary,..... 3252 — Weighed,....3123; Not weighed, 129
  - Dispensary only, ..2973
  - Dispensary and hospital,..... 279
- Number of patients treated in hospital, 760 — Weighed,. .. 641; Not weighed, 119
  - Hospital only,..... 481
  - Hospital and dispensary,..... 279
- Number of patients weighed in dispensary,.....3123
  - Gained,.....1495 — Total gain,.....9531.13; Average gain,..... 6.37
  - Lost,..... 974 — Total loss,.....5084.95; Average loss, ... 5.22
  - No change recorded,..... 654
- Number of patients weighed in hospital,..... 641
  - Gained,..... 288 — Total gain,.....2780.45; Average gain,..... 9.65
  - Lost,..... 181 — Total loss,.....1016.00; Average loss, ... 5.61
  - No change recorded,..... 172

The report of the Institute for the four years as shown in the summary of aid given, inspections, observance of rules, weight and results of treatment conveys a pretty fair idea of what can be accomplished in the crusade against the disease through dispensaries and hospitals. The five items should be studied together.

RESULTS OF TREATMENT.

New cases,..	Number of cases disease arrested,.....	Hospital,.....	0	7	734
		Dispensary,.....	7		
	Number of cases improved,	Hospital,.....	50	271	
		Dispensary,.....	221		
	Number of cases unimproved,.....	Hospital,.....	68	254	
		Dispensary,.....	186		
	Number of cases who made only one visit,.....	Dispensary,.....	133	133	
	Number of cases terminated in death,.....	Hospital,.....	49	69	
		Dispensary,.....	20		
	Number of cases results not recorded,.....	Hospital,.....	0	0	
		Dispensary,.....	0		
Old cases,...	Number of cases disease arrested,.....	Hospital,.....	3	33	432
		Dispensary,.....	30		
	Number of cases improved,	Hospital,.....	40	219	
		Dispensary,.....	179		
	Number of cases unimproved,.....	Hospital,.....	24	137	
		Dispensary,.....	113		
	Number of cases results not recorded,.....	Hospital,.....	0	6	
		Dispensary,.....	6		
	Number of cases terminated in death,.....	Hospital,.....	18	37	
		Dispensary, ...	19		
Summary for four years,.	Number of cases disease arrested,.....	Hospital,.....	6	64	3733
		Dispensary,.....	58		
	Number of cases improved,	Hospital,.....	213	1291	
		Dispensary,.....	1078		
	Number of cases unimproved,.....	Hospital,.....	266	1234	
		Dispensary,.....	968		
	Number of cases terminated in death,.....	Hospital,.....	298	487	
		Dispensary,.....	189		
	Number of cases who made only one visit,.....	Dispensary,.....	213	213	
	Number of cases results not recorded,.....	Hospital,.....	0	444	
		Dispensary,.....	444		

During the current year, out of six hundred and twelve new patients treated in the dispensary 52.61% received milk and 100% received preventive measure supplies. During the three years for which a summary is made, 41.34% of the patients treated in the dispensary received milk and 74.19% preventive measure supplies.

As the work of the Institute has developed, better control of

the patients has been secured and a larger percentage of patients have been supplied with preventive measure supplies. These preventive measure supplies consist of paper sputum cups, tin sputum cup holders, paper napkins, paper bags, and occasionally "red seal" lye. A bundle of the necessary material for prevention for two weeks is given to each patient when he visits the dispensary. The cost of these articles averages about three mills per patient per day. The Institute purchases the paper bags and paper napkins at wholesale prices and makes the paper sputum boxes out of paper purchased in large quantities with the labor of house patients who are able to do light work.

Patients receiving milk get from one to three quarts a day according to their inability to purchase milk for themselves. The average cost under this arrangement based upon the entire number of patients treated is about four cents per patient per day. Most of the milk is bought at wholesale rates and is dispensed from milk stations by the nurses who act for the time being as inspectresses. Some of the milk is served by milkmen at retail rates. Medicine is given to all patients at a small charge in order that they may not appear to be altogether dependent upon charity. The charge is nominal and does not cover the cost of material. The cost of drugs and the druggist's salary bring the item of medication for dispensary cases up to about one cent per patient per day.

Inspection is an important factor in dispensary treatment of tuberculosis. The Institute hopes in time to make its inspection complete. We have had some difficulty in maintaining a full nursing staff and frequently inspection had to be omitted because the nurses could not be spared from other duties. During the year the percentage of inspections has been lower than during the preceding year. The average cost of inspection has been about two mills per patient per day, and if all patients were inspected as often as they should be the cost would probably be about six mills per patient per day.

The nurses who make the inspection are required to report upon the observance of rules, particularly in those matters which have to do with the prevention of the disease. The percentage of patients who observed rules well is quite high. Out of one hundred and ninety-six cases about whom a record was made as to observance of rules during the current year the rules were observed well in 81.63%, fairly well in 13.26%, and not observed in 5.10%; and for the three years, out of eight hundred and fourteen cases about whom a record was made as to observance of rules the rules were observed well in 73.46%, fairly well in 20.51%, and not observed in 6.01%. Usually the patient is quite anxious to co-operate with the Institute in the prevention of the disease when the purpose of the rules which have been laid down is clearly explained to him.

The entire cost of dispensary treatment of patients, including rent, heat, light, milk, medication, preventive measure supplies, salaries for clerks and druggists, postage, carfare, office supplies, and the salary of the Assistant Medical Director of the Institute, based upon the entire number of patients treated at the Institute, is about nine cents per patient per day.

The results of treatment as shown by weight are very good both in the dispensary and in the hospital. For the current year, out of five hundred and ninety-eight new patients weighed in the dispensary 41.80% were recorded as having gained weight, the average gain being 5.51 lbs.; 28.59% were recorded as having lost, the average loss being 3.77 lbs.; and of 29.59% no change of weight was recorded. Out of one hundred and fifty-five new patients weighed in the hospital during the year 47.09% were recorded as having gained weight, the average gain being 8.86 lbs.; 36.12% were recorded as having lost, the average loss being 5.34 lbs.; and of 16.77% no change of weight was recorded. Of the three thousand one hundred and twenty-three patients weighed in the dispensary during the four years, 47.87% were recorded as having gained weight, the average gain being 6.37 lbs.; 31.19%

as having lost weight, the average loss being 5.22 lbs.; and of 20.94% no change of weight was recorded. The number three thousand one hundred and twenty-three includes one hundred and eighty patients treated in the hospital and dispensary, but the gain and loss just given represent the gain and loss in the dispensary only. Of the six hundred and forty-one patients weighed in the hospital 44.93% gained weight, the average gain being 9.65 lbs.; 28.24% lost weight, the average loss being 5.61 lbs.; and of 26.83% no change in weight was recorded. Here again the number six hundred and forty-one includes one hundred and sixty-three cases which were treated both in the hospital and dispensary, but the weight given is the weight taken in the hospital only.

The results of treatment as checked off by the record of improvement is not nearly so good as one would expect to find from the record of weights. For the current year, out of four hundred and thirty-four new patients who made more than one visit to the dispensary and for which the result was credited to the dispensary 1.61% were recorded as having the disease arrested; 50.92% as improved; 42.85% as unimproved; and 4.60% as having died. Out of one hundred and sixty-seven new patients treated in the hospital 29.94% were recorded as improved; 40.71% as unimproved; and 29.34% as having died. Of the three hundred and forty-seven old or return patients treated in the dispensary during the current year, 8.64% were recorded as having the disease arrested; 51.58% as improved; 32.56% as unimproved; 5.47% as having died; and of 1.72% no results were recorded. Of the eighty-five hospital patients who had remained over from the preceding year or who had been treated before 3.52% were recorded as having the disease arrested; 47.06% as improved; 28.23% as unimproved; and 21.17% as having died. In the summary for four years, out of two thousand seven hundred and thirty-seven patients who came to the dispensary more than once 2.11% were recorded as having had the disease arrested; 39.38%

as improved; 35.36% as unimproved; 6.90% as having died; and of 16.22% no result was recorded. Of seven hundred and eighty-three patients treated during this time in the hospital .76% were recorded as having had the disease arrested; 27.20% as improved; 33.97% as unimproved; 38.05% as having died. Inasmuch, however, as the words "disease arrested" are very severely interpreted this showing is perhaps better than it looks. Disease arrested at the Phipps Institute means as much as cured in most institutions, since the word cured is not permitted to be used at all in the records. Taking the dispensary cases which made more than one visit and the hospital cases together, 1.81% were recorded as having the disease arrested; 36.67% as improved; 35.05% as unimproved; 13.83% as having died; and of 12.61% no record was made as to the result.

The two items in which there is most difference between the dispensary and hospital cases are disease arrested and death, in both of which the results were better in the dispensary than in the hospital. In this connection, however, it must be kept in mind that the hospital is for advanced cases only and that all cases which are admitted are expected to die, while the dispensary is for ambulant cases, very few of which are supposed to be far enough advanced to be classified in the terminal stage. Dying cases do come to the dispensary, however, either because they cannot be admitted into the hospital for want of room or because they have a prejudice against entering an institution during the terminal period of the disease.

Undoubtedly the best result obtained in both the dispensary and the hospital is prevention. The dispensary is an excellent means of bringing ambulant tuberculous subjects under control and discipline and of getting into the homes of such patients to educate and direct them and the healthy members of the family for protection and self-preservation. The hospital removes from the home the dying consumptive during the most contagious period of the disease, thereby relieving the family of a burden

which bears heavily and taking from its midst a source of contagion which it has not the means to abate and protect itself against. It is practically impossible for poor people living under unhygienic conditions with insufficient air space and lacking the necessities of life and the ordinary commodities of home to so care for a member who is in the dying stage of tuberculosis as to make him harmless. To make such a patient innocuous requires constant supervision and is a relatively expensive process even in a hospital. It is impracticable in the homes of the very poor even with the constant supervision of a nurse and unlimited financial resources.

SPECIAL EXAMINATIONS.

Patients who were recorded as having had	Nose and throat examination made,..227 Nervous examination made,..... 35 Skin examination made,..... 4 Eye examination made,..... 5	Out of 734 new cases
Patients who were recorded as having had	Nose and throat examination made,..907 Nervous examination made,.....735	Out of 3733, summary for four years
	Skin examination made,..... 10 Eye examination made,..... 17	Out of 1389, summary for two years

LAWRENCE F. FLICK.

A STUDY OF THE BLOOD IN PULMONARY TUBERCULOSIS.

The following study is based upon the examination of the blood of eighty-three cases of pulmonary tuberculosis during a period of two years. The work of the first year was performed in conjunction with Dr. J. T. Ullom, and has been previously published.* In the present paper the percentages of the various forms of leucocytes are given instead of the actual number of each variety per cubic millimeter, as in the former article.

The number of red corpuscles and leucocytes per cubic millimeter was estimated by means of the Thoma-Zeiss apparatus, the percentage of hemoglobin by means of Dare's hemoglobinometer. To obtain the percentage of the different forms of leucocytes the blood was spread on slides or cover-glasses, stained with Wright's stain, and five hundred leucocytes were counted.

The patients have been grouped according to the classification adopted by the National Association for the Study and Prevention of Tuberculosis.†

Only two patients corresponded to the requirements of Stage I, eight of Stage II, and the majority of the cases, seventy-three, belonged to Stage III.

---

* American Journal of Medical Sciences, September, 1905.

† Stage I: Slight initial lesion in the form of infiltration limited to the apex or a small part of one lobe. No tuberculous complications. Slight or no constitutional symptoms. Slight or no elevation of temperature or acceleration of pulse at any time during the twenty-four hours, especially after rest. Expectoration usually small in amount or absent.

Stage II: No marked impairment of function, either local or constitutional. Localized consolidation moderate in extent, with little or no evidence of destruction of tissue or disseminated fibroid deposits. No serious complications.

Stage III: Marked impairment of function, local and constitutional. Localized consolidation intense; or disseminated areas of softening; or serious complications.

TABLE I.—AVERAGE BLOOD FINDINGS ACCORDING TO STAGES.

	Stage I. (2 Cases.)	Stage II. (8 Cases.)	Stage III. (73 Cases.)
Hemoglobin,	58%	68%	63%
Color-index,	.65	.72	.67
Erythrocytes,	4,481,500	4,737,000	4,667,000
Leucocytes,	9,440	11,385	15,000
Lymphocytes,	20.8%	12.7%	9.5%
Large mononuclears,	13.8%	12.1%	7.6%
Transitionals,	7.9%	6.4%	8.6%
Polymorphonuclears,	54.6%	64.8%	71.9%
Eosinophiles,	2.3%	3.4%	1.8%
Basophiles,	.6%	.5%	.3%

On studying the various averages in the three stages it will be noted that they all show a surprisingly high erythrocyte count and a very low percentage of hemoglobin; in other words, a blood picture of the chloro-anemic type, the color-index in all the stages being low. The low color-index was the most common finding in all the examinations; only eight times out of one hundred and sixteen separate examinations was it above .95, and only three of these showed an index above 1.0. A rather surprising feature was the constantly high erythrocyte count in all the stages, it being practically normal even in Stage III.

When the findings in the three stages are compared with one another, it will be seen that the percentage of hemoglobin and the number of erythrocytes are lower in Stage I than in Stages II and III, the findings in Stage III being slightly less than Stage II. This increase in the hemoglobin and red corpuscles in the more advanced cases has been noted by previous observers and has been explained on the ground of concentration of the blood, due to diarrhea, night-sweats, profuse expectoration, or a specific action of the toxins of the tuberculous process. Judging from the present study, the last-named would seem to be the most probable cause for the concentration, as only two of the eight cases in Stage II showed any of the other causes mentioned. These two cases had diarrhea, and in neither of them was the

percentage of hemoglobin or the erythrocyte count exceptionally high.

The decrease in the number of erythrocytes in the cases in Stage III has been ascribed to a secondary, true anemia, due to a lowering of general nutrition.

The slight increase in the number of leucocytes in the cases in Stage II has been also ascribed to the concentration of the blood in the more advanced cases. The increase in their number in the cases in Stage III is probably a manifestation of some secondary infection.

The general blood findings in tuberculosis may be summarized as follows:

1. A normal erythrocyte count, a low percentage of hemoglobin, and a low color-index—chloro-anemia; the percentage of hemoglobin and the number of erythrocytes being somewhat higher in the cases in Stage II than in Stage I or III.

2. A normal number of leucocytes in cases in Stage I, a slight increase in Stage II, and a distinct leucocytosis of low grade in Stage III.

THE PERCENTAGES OF THE VARIOUS FORMS OF LEUCOCYTES.

When the relative percentages of the various forms of leucocytes in the three stages are compared, several points stand out as very characteristic, namely:

1. The lymphocytes and large mononuclears show a high percentage in Stage I, the percentage is lower in Stage II, and lowest in Stage III.

2. The polymorphonuclears bear an inverse relation to the mononuclear cells, being quite low in Stage I, gradually increasing in Stage II, and again in Stage III.

3. The eosinophiles are slightly irregular, rising from 2.3 per cent. in Stage I to 3.4 per cent. in Stage II, and falling to 1.8 per cent. in Stage III.

TABLE II.—THE RELATION BETWEEN THE BLOOD FINDINGS AND CAVITY FORMATION IN STAGE II.

	Slight Cavity Formation. (3 Cases.)	No Cavity Formation. (5 Cases.)
Hemoglobin,	60%	72%
Color-index,	.61	.78
Erythrocytes,	4,909,000	4,639,000
Leucocytes,	9,750	12,360
Lymphocytes,	14.3%	11.7%
Large mononuclears,	13.7%	11.0%
Transitionals,	6.7%	6.2%
Polymorphonuclears,	62.1%	66.4%
Eosinophiles,	2.6%	3.9%
Basophiles,	.5%	.5%

TABLE III.—IN STAGE III.

	Complicated Cases.	Uncomplicated Cases.		
	A. With cavity. (62 Cases.)	B. With and without cavity. (11 Cases.)	C. With cavity. (8 Cases.)	D. Without cavity. (3 Cases.)
Hemoglobin,	62%	67%	72%	55%
Color-index,	.67	.70	.79	.51
Erythrocytes,	4,643,000	4,801,000	4,578,000	5,395,000
Leucocytes,	15,440	12,500	12,820	11,630
Lymphocytes,	9.4%	8.2%	7.8%	9.2%
Large mononuclears,	7.8%	9.0%	6.9%	14.4%
Transitionals,	8.4%	9.4%	9.7%	8.6%
Polymorphonuclears,	71.9%	70.6%	73.0%	64.0%
Eosinophiles,	1.7%	2.3%	2.0%	3.1%
Basophiles,	.3%	.4%	.4%	.4%

The blood findings were studied to determine the effect, if any, of cavity formation upon the blood picture. A comparison of the blood findings in cases of Stage II (Table II) with and without cavity formation shows a most unexpected condition. The cases with cavity formation show a lower percentage of hemoglobin, a lower color-index, a greater number of erythrocytes, a distinctly *lower number of leucocytes*, a higher percentage of lymphocytes and large mononuclears with the polymorphonuclears correspondingly less, and a slightly lower percentage of eosinophiles.

As all of the "complicated cases"* in Stage III showed cavity formation; only the "uncomplicated cases" were available for comparison in relation to cavity formation. The "uncomplicated cases" of Stage III (Table III, C and D) showed just the reverse of the findings in Stage II. In the cases with cavity formation the percentage of hemoglobin, the color-index, and the number of leucocytes were greater and the number of erythrocytes was less. They also showed a lower percentage of lymphocytes and large mononuclears with a corresponding increase in the percentage of polymorphonuclears. The only finding common to both Stage II and Stage III was a higher percentage of eosinophiles in the cases without cavity formation.

The finding of a greater number of leucocytes in the cases in Stage II without cavity formation is of special importance, as numerous observers have described an increase in the number of leucocytes as an indication of the presence of cavity formation.

As the findings in Stage III were based on cases in which the presence of cavity or cavities was absolutely without question, while in the cases in Stage II the diagnosis was not absolute, the contradictory findings in the two stages may thus be explained. In all three cases with cavity formation in Stage II the diagnosis was of "old cavity"—in two of the cases at the right apex and in one at the left apex.

THE RELATION BETWEEN THE BLOOD FINDINGS AND VARIOUS COMPLICATIONS.

Comparing the average findings in the cases in Stage III (Table III, A and B) showing complications with the uncomplicated cases, we note that the uncomplicated cases show a higher hemoglobin percentage, color-index, and erythrocyte count, and a smaller number of leucocytes. The percentages of the different forms of leucocytes are almost the same in the two classes of cases.

* Under the heading "Complicated Cases" are grouped all cases in which any complication, either tuberculous or non-tuberculous, was present. A list of various complications will be found in Tables IV and V.

TABLE IV.—BLOOD FINDINGS IN STAGE III. CASES SHOWING BUT ONE COMPLICATION.

	Albumin. (6 Cases.)	Albumin and Casts. (2 Cases.)	Casts. (6 Cases.)	Laryngeal Tuberculosis. (3 Cases.)	Hemoptysis. (2 Cases.)	Glandular Tuberculosis. (5 Cases.)	Intestinal Tuberculosis. (1 Case.)	Pleurisy. (1 Case.)
Hemoglobin,	72%	62%	78%	61%	47%	48%	55%	not recorded
Color-index,	.80	.65	.76	.63	.49	.50	.56	not recorded
Erythrocytes,	4,487,000	4,770,000	5,160,000	4,819,000	4,803,000	4,758,000	4,930,000	3,890,000
Leucocytes,	14,960	19,500	11,350	16,720	17,500	17,130	17,920	15,840
Lymphocytes,	9.7%	5.9%	9.3%	4.9%	7.0%	7.7%	5.4%	19.4%
Large mononuclears,	5.2%	9.5%	7.0%	8.2%	10.8%	10.9%	10.0%	2.0%
Transitionals,	7.3%	7.1%	8.4%	9.6%	6.1%	6.6%	7.2%	6.6%
Polymorphonuclears,	75.4%	75.9%	72.5%	74.9%	73.9%	72.6%	76.6%	70.4%
Eosinophiles,	1.9%	1.4%	2.4%	1.3%	1.8%	2.0%	.4%	1.6%
Basophiles,	.4%	.2%	.2%	.6%	.4%	.2%	.4%	.0%

TABLE V.—BLOOD FINDINGS IN STAGE III. CASES WITH MORE THAN ONE OF THE COMPLICATIONS GIVEN IN THE TABLE.

	Albumin. (8 Cases.)	Albumin and Casts. (11 Cases.)	Casts. (3 Cases.)	Laryngeal Tuberculosis. (7 Cases.)	Hemoptysis. (3 Cases.)	Glandular Tuberculosis. (8 Cases.)	Intestinal Tuberculosis. (10 Cases.)	Pleurisy. (5 Cases.)	Pneumothorax. (5 Cases.)
Hemoglobin,	67%	51%	48%	59%	54%	55%	49%	53%	71%
Color-index,	.79	.57	.45	.65	.53	.58	.53	.62	.80
Erythrocytes,	4,258,000	4,488,000	5,285,000	4,534,000	5,136,000	4,737,000	4,662,000	4,284,000	4,451,000
Leucocytes,	18,180	15,890	14,420	15,590	16,480	17,550	18,360	15,700	16,040
Lymphocytes,	7.2%	9.5%	10.3%	6.6%	8.4%	6.4%	7.8%	4.9%	9.3%
Large mononuclears,	4.8%	5.7%	10.6%	7.1%	9.4%	7.0%	7.0%	4.7%	3.0%
Transitionals,	8.1%	7.4%	7.7%	9.0%	8.6%	7.3%	6.7%	8.0%	8.6%
Polymorphonuclears,	78.2%	74.8%	68.6%	74.2%	69.2%	77.2%	75.8%	81.2%	78.1%
Eosinophiles,	1.0%	1.9%	2.2%	2.5%	3.8%	1.5%	1.7%	.7%	.7%
Basophiles,	.3%	.3%	.4%	.4%	.5%	.4%	.4%	.4%	.1%

In the study of the changes in the blood in cases with complications, only those cases were selected in which there was but one complication. As all of the cases with complications showed cavity formation, the findings will be compared with the findings in the uncomplicated cases in which cavity formation was also present (Table III, C).

There were six cases in which *albumin* in the urine was the only complication. The blood findings in these cases were practically identical with the findings in the uncomplicated cases. In the six cases in which *casts* in the urine were found to be the only complication a slightly higher erythrocyte count was the only variation from the uncomplicated cases. Two cases with both *albumin and casts* in the urine showed a much lower percentage of hemoglobin, a lower color-index, and a distinctly higher leucocyte count; the relative percentage of the various forms of leucocytes remaining about the same as in the uncomplicated cases.

The blood was examined in two cases during *hemoptysis* to determine the effect of this complication upon the blood picture. The average finding in these two cases differed from that in the uncomplicated cases only in a very low percentage of hemoglobin, a low color-index, and a distinct increase in the number of leucocytes.

None of the five cases of *glandular enlargement* showed a very marked increase in the size of the glands; in other words, they were not cases in which the glandular condition was a prominent feature. The study of the blood, therefore, in these few cases would appear to be of very little value, as many of the other cases may have had just as marked enlargement of the deeper glands, which could not be detected clinically. The blood showed in these cases, however, merely a slightly higher percentage of large mononuclears.

In one case *intestinal tuberculosis* was the only complication. The blood in this patient showed a slight increase in the percentage

of large mononuclears, and a decrease in the percentage of eosinophiles as the only variation from the group average.

One case in which *pleurisy* was the only complication showed a marked decrease in the number of erythrocytes, a distinct increase in the percentage of lymphocytes, and an absence of basophiles.

In studying the blood findings in the various complications one is impressed by the very slight and inconstant variations from the group average exerted by any single complication. No single complication presented a blood picture which would be sufficiently distinctive to be of any practical clinical value.

The cases showing more than one complication are grouped above (Table V) under the headings of the various complications for comparison with the cases with but a single complication. The

TABLE VI.—BLOOD FINDINGS IN STAGE III. CASES GROUPED ACCORDING TO THE CLINICAL TYPE OF THE TUBERCULOSIS.

	Acute Tuberculosis.			Chronic Ulcerative Tuberculosis.			Chronic Fibroid Tuberculosis.	
	Complicated. (6 Cases.)	Uncomplicated. (1 Case.)	Total. (7 Cases.)	Complicated. (52 Cases.)	Uncomplicated. (10 Cases.)	Total. (62 Cases.)	Complicated. (4 Cases.)	Uncomplicated. (None.)
Hemoglobin,.....	52 %	90 %	71 %	59 %	62 %	60 %	58 %	...
Color-index,.....	.59	.89	.75	.63	.65	.63	.67	...
Erythrocytes,.....	4,425,000	5,040,000	4,732,500	4,693,000	4,777,000	4,735,000	4,311,000	...
Leucocytes,.....	22,560	10,600	16,580	14,650	12,690	13,670	15,220	...
Lymphocytes,.....	4.0 %	4.2 %	4.1 %	9.8 %	8.6 %	9.7 %	9.2 %	...
Large mononuclears,.....	6.5 %	3.6 %	5.0 %	7.9 %	9.5 %	8.8 %	6.5 %	...
Transitionals,.....	6.7 %	12.6 %	9.6 %	8.8 %	9.0 %	8.6 %	7.7 %	...
Polymorphonuclears,.....	81.5 %	77.2 %	79.3 %	70.9 %	69.9 %	70.2 %	74.7 %	...
Eosinophiles,.....	.9 %	1.8 %	1.3 %	1.8 %	2.3 %	2.0 %	1.2 %	...
Basophiles,.....	.3 %	.6 %	.4 %	.3 %	.4 %	.3 %	.4 %	...

complications in the majority of the cases were so numerous, many of the cases showing several of the complications mentioned, that the findings deserve no special comment for obvious reasons.

The average findings in the various types of tuberculosis show very little difference in the percentage of hemoglobin or in the number of erythrocytes or leucocytes. The average findings in the cases of acute tuberculosis did show a decrease in the percentage of lymphocytes to less than half that in the other two groups, with a somewhat higher percentage of polymorphonuclears. This is exactly what one would expect to find in the acute cases, where mixed infection seems to play such an important part.

TABLE VII.—BLOOD FINDINGS IN STAGE III. CASES GROUPED ACCORDING TO THE CLINICAL CONDITION.

	Much Improved. (2 Cases.)	Improved. (25 Cases.)	Stationary. (22 Cases.)	Progressive. (24 Cases.)
Hemoglobin,.....	56%	65%	58%	62%
Color-index,.....	.52	.70	.67	.66
Erythrocytes,.....	5,408,000	4,614,000	4,326,000	4,728,000
Leucocytes,.....	11,660	13,390	16,280	15,990
Lymphocytes,.....	11.9%	10.4%	9.5%	6.7%
Large mononuclears,.....	13.5%	8.6%	7.0%	5.9%
Transitionals,.....	9.9%	8.7%	7.9%	8.3%
Polymorphonuclears,.....	61.3%	68.8%	73.5%	77.0%
Eosinophiles,.....	3.0%	2.5%	1.4%	1.3%
Basophiles,.....	.4%	.4%	.3%	.3%

The findings have been studied with the object of determining the relation between the blood findings and the patient's general condition at the time the examination was made; whether from the time they came under observation until the date of the blood examination the cases had been improved, remained stationary, or become progressively worse. As all of the cases in Stages I and II were either improved or the disease had become arrested, they offered no means of comparison. In Stage III, however, were many cases under the varying conditions of improvement or progression which offered a means of contrasting the findings.

The study of the average findings reveals the peculiar fact that the cases grouped under the heading "much improved" had a lower percentage of hemoglobin than the cases which were simply "improved"; in fact, the "much improved" gave the lowest percentage of hemoglobin of all the groups. The "stationary" cases also showed a lower hemoglobin percentage than the "progressive." The erythrocytes showed the highest number in the cases which were "much improved," being practically the same in the other three groups.

The number of leucocytes follows quite closely the degree of improvement, being lowest in the "much improved," gradually increasing in number in the "improved," and reaching the highest count in the "stationary" cases. The slight decline in the number of leucocytes in the "progressive" cases may be compared to the decrease of resistance occasionally seen in severe or overwhelming septic infections with a consequent failure of the organism to produce a "leucocytic reaction."

The percentages of the various forms of leucocytes in the different classes are quite characteristic. The percentages of lymphocytes and large mononuclears are highest in the "much improved" cases, with a gradual decline in the other groups, being lowest in the "progressive" cases. The percentage of polymorphonuclears bears an inverse relation to the above, being lowest in the "much improved" and highest in the "progressive" cases. The eosinophiles also show a definite relation to the degree of improvement, the "much improved" cases showing the highest and the "progressive" cases the lowest percentage. The difference in the percentages of basophiles is so slight that no importance can be attached to it.

EOSINOPHILES IN TUBERCULOSIS.

As special stress has been laid by various writers on the importance of the eosinophiles as an indication of resistance to

tuberculosis, they are specially considered. It will be noted that in Table I the percentage of eosinophiles is lower in Stage III than in either Stage I or II; moreover, in Table II it is lower in cases with than in cases without cavity formation. In Stage III cases (Table III) the percentage of eosinophiles was lower in the complicated than in the uncomplicated cases, and in the uncomplicated cases it was lower in the cases with than in the cases without cavity formation. The eosinophiles also showed a lower percentage in the acute than in the chronic cases (Table VI). Attention has already been called to the decrease in the percentage of this form of leucocyte from the "much improved" to the "progressive" cases (Table VII).

From the foregoing one would conclude that the more unfavorable the conditions, the lower the percentage of eosinophiles. This must be accepted, however, as true in only the most general way, as the most striking exceptions are constantly met with, and too much weight must not be laid upon it in individual cases.

CONCLUSIONS.

1. All cases of pulmonary tuberculosis, with very few exceptions, show a chloro-anemia, this being characterized by either a normal or slightly subnormal number of erythrocytes with a markedly low percentage of hemoglobin.

2. Cases with slight or moderate amount of involvement show no increase in the number of leucocytes. The more advanced cases, unless complicated by some other condition, show a leucocytosis of only moderate grade.

3. The earlier the disease or the smaller the amount of involvement, the higher the percentage of lymphocytes and large mononuclears, and the lower the percentage of polymorphonuclears. The reverse also holds true: the more advanced and unfavorable the disease, the lower the percentage of lymphocytes and large mononuclears, and the higher the percentage of polymorphonuclears.

4. The significance of an increase in the number of leucocytes with a relative increase in the number of polymorphonuclears as an indication of cavity formation is of very doubtful or no value.

5. None of the usual complications of pulmonary tuberculosis give a blood picture which is distinctive enough to be of any practical value.

6. In a general way, a high percentage of eosinophiles may be taken as an indication of favorable significance, though exceptions to this rule are frequently met with.

FRANK A. CRAIG.

ALBUMIN AND CASTS IN PULMONARY TUBERCULOSIS.

The figures presented last year in regard to albuminuria referred especially to the number of times albumin occurred in the urine in pulmonary tuberculosis. The figures in the present report are intended to show, in addition, the amount of albumin commonly found in this disease.

Tests for Albumin.—Two tests for detecting albumin in the urine will be referred to at various times. The first we shall call the heat and acetic acid test. This consists in heating the upper portion of clear urine in a test-tube till boiling takes place, after which a few drops of strong acetic acid—the exact amount depending on the degree of acidity or alkalinity of the specimen—are added carefully to the heated portion of urine. The upper layer of urine is then again heated.

The second test will be referred to as the salt, acetic acid, and heat test. This consists in adding to the urine in a test-tube one-fifth its volume of a saturated sodium chloride solution. The remainder of the test is carried out after the manner of the first test, heat and acetic acid being used.

The second test is more reliable in revealing the presence of serum-albumin, and in differentiating it from other forms of albumin common in the urine. Nucleo-albumin is precipitated in many cases where acetic acid and heat alone are used, but fails to appear with the salt, acetic acid, and heat test. In both tests albumin that would otherwise fail to be demonstrated will frequently appear if the urine is allowed to stand for several minutes after the final heating. The second test is of special value in

urines of low specific gravity, on account of the smaller amount of sodium chloride usually present. The advantages of the salt, acetic acid, and heat test have been very clearly demonstrated by Hastings and Hoobler.[15]

We have applied both tests to thirty-three specimens of urine from tuberculous patients, with the following results: The acetic acid test without the salt solution gave a more marked reaction in ten of the specimens, and the same test plus the salt solution gave a more marked reaction in fourteen of the specimens. The difference in the amount of reaction with the two tests was usually very slight. In nine of the thirty-three specimens no reaction was obtained with either test. In one case a reaction was obtained when the salt solution was employed, no reaction having been obtained with the simple acetic acid and heat test. In one instance the reaction failed to appear when the salt solution was used, but was obtained when the salt solution was omitted.

In order to determine whether different results would be obtained on the substitution of nitric for acetic acid in the salt, acetic acid, and heat test, forty-five specimens of urine were tested in both ways, the only differences being that no heat was used after the addition of the nitric acid, and only one drop of this acid was used. In sixteen specimens a similar reaction was obtained with both acids, in fifteen no reaction was obtained with either acid. In the remaining fourteen specimens differences were noted, but they were nearly always very slight. The amount of albumin present was usually described as a faint trace or a trace, rarely as a marked cloud. A more marked reaction was obtained with the acetic acid in ten cases and with the nitric acid in four cases. On two occasions no albumin was detected with nitric acid while a faint trace was seen with acetic, and once acetic acid failed to show albumin when a faint trace was revealed with nitric. The examiner of the specimens in these cases, it may be mentioned, was more experienced in the use of acetic than of nitric acid as a test for albumin.

Albuminuria.—According to records taken from the histories of patients in the tuberculosis wards at the Philadelphia Hospital, where the cases are chiefly of the moderately advanced and far advanced type, out of one hundred and fifty-eight urine examinations in forty-one (25.9%) albumin was recorded as present and in one hundred and seventeen (74.0%) albumin was recorded as absent. In only several instances was more than one specimen examined. Among the forty-one specimens containing albumin the albumin was described as a "trace" in twenty-one, and as "present" in twenty.

In a number of cases at the Phipps Institute we have studied albumin in regard to its frequency, its amount, and its association with casts.

In describing the amount of albumin we shall usually use the terms absent, a trace, considerable, or enough to be estimated with Esbach's albuminometer (0.1% or more).

The cases have been divided into three groups. The first consists of three hundred and ninety-eight dispensary and house cases observed during the past year, chiefly moderately advanced and far advanced cases. In these albumin was found one hundred and forty times (35.2%). The albumin occurred without casts in sixty-eight cases (17.1%), and with casts in seventy-two cases (18.1%). Casts without albumin occurred in fifty-seven cases (14.3%). The test employed was heat and acetic acid.

In the second group, consisting of eighty ward patients, all with tubercle bacilli in their sputum, the urines contained albumin as follows. (The test was heat and acetic acid. The examinations were usually made at the time of admission to the house.) Albumin was present in forty cases (50.0%). Among the cases of albuminuria a trace of albumin was present in thirty-three cases, a considerable amount in three. Among the remaining four cases it is stated that there was enough albumin to register with the Esbach albuminometer in three; while in the fourth case there was a very heavy cloud, and probably enough albumin

was present to estimate with the albuminometer, though this was not stated.

Of the eighty cases, both albumin and casts were examined for in sixty-nine. Of these, albumin was present in thirty-five (50.7%). It occurred with casts in twenty-seven (39.1%) and without casts in eight (11.6%). Casts alone occurred in thirteen (18.8%).

In the third group, consisting of fifty-eight ward patients, usually examined at the time of admission, all with tubercle bacilli in their sputum, the following results were obtained with salt solution, acetic acid, and heat. Albumin was present in thirty-two cases, or 55.2%. A trace of albumin occurred in twenty-five, a considerable amount in six, and on one occasion there was enough to estimate with the albuminometer.

These fifty-eight cases were examined for casts as well as albumin. Casts as well as albumin were found in twenty-nine cases (50.0%), and were not found with albumin in three cases (5.17%). Casts alone occurred in thirteen cases (22.4%).

Albuminuria in Frequent Examinations.—In a study of the urines of twelve cases of tuberculosis during periods before death varying from eight to one hundred and fourteen days, the following results were obtained. The cases were typical advanced cases, no unusual clinical complications existing. (The test employed was the salt, acetic acid, and heat test. The same series of cases is treated of in connection with casts, *q.v.*) Eighty-three specimens were examined, some being voided as late as the day of death. Albumin was present in all the specimens except one which was passed thirteen days before death. In the remaining eighty-two specimens a trace was present fifty-five times, a considerable quantity twenty-seven times. Of the fifty-five specimens with a trace of albumin, there was only a faint trace in fifteen.

One patient (No. 4920) was studied during a period of four and a half months. She was a mulatto girl, single, aged seven-

teen, fairly well nourished, with considerable involvement on the left side (infiltration of apex with chronic pleuritis over rest of lung) and a slight infiltration of the right apex. Her temperature fluctuated between 97° or 98° and 99° or 100°, rarely above this. The sputum was moderate in amount and contained tubercle bacilli. She was rarely confined to bed except when her temperature demanded it. She left the hospital in a slightly improved condition. There was only a very slight accentuation of the second sound at the aortic cartilage, and there was no edema or other evidence of nephritis. The case was decidedly chronic in character.

In ninety-four specimens of her urine albumin was present in seventy-seven and absent in seventeen. The amount was described as a trace in thirty-seven, as considerable in thirty-seven, and on three occasions there was enough albumin to register with the Esbach albuminometer, the amounts being 0.1%, 0.166%, and 0.233%. Marked variations would sometimes occur during the twenty-four hours. Thus a considerable amount would be present in the evening, and not a trace of albumin the next morning.

In eighty-five specimens from the same case the hour of voiding was recorded. In the period between 6 A. M. and 12 M. there were eleven examinations, albumin being absent twice, a trace occurring four times, and a considerable amount five times. The period between 12 M. and 6 P. M. showed the greatest proportion of large amounts of albumin. There was no albumin twice, a trace fourteen times, and a considerable amount twenty-six times. The 6 P. M. to 12 P. M. period rather closely resembled the 6 A. M. to 12 M. period. In this period albumin was absent twice, there was a trace five times, a considerable amount seven times, and enough to be measured with the albuminometer once. The period that was most different from the general average occurred between 12 P. M. and 6 A. M. Albumin was absent seven times, there was a trace eight times, and a considerable amount only twice.

It will be noted that larger amounts of albumin were present during the day, when the patient was up and about and was taking her nourishment, than during the night. The largest amounts were observed in the afternoon, the patient by this time having been up several hours and also having had her dinner. The reduction in the amount of albumin during the sleeping hours is striking. The variations in the amount of urine may have had something to do with the different amounts of albumin observed, but at most can only serve as part of the explanation.

The last examination of her urine before leaving the hospital showed no albumin, though casts, which had always been present on previous examinations, still persisted.

Another patient (No. 5014), male, eighteen years old, a far advanced case with cavity formation and with tubercle bacilli in the sputum, had his urine examined over a period of nearly three months. In thirty-five examinations albumin was absent nine times, there was a faint trace fifteen times, and a trace eleven times. (The test was salt, acetic acid, and heat.) Casts were examined for eleven times and were present three times, always in association with albumin. In six examinations neither albumin nor casts were present, and in two specimens albumin was present unassociated with casts. Three months later the patient was still living, his general condition being somewhat though not a great deal worse. The examinations now showed either no albumin or only the faintest trace, and usually many casts, chiefly granular.

These results are typical of many advanced cases of the more chronic type. They show how variable the findings may be, and also that the number of casts may increase with the progress of the disease while the amount of albumin may remain stationary.

Our figures have some bearing on the question of the effect of milk and eggs in the production of albuminuria. Practically all the cases in which more than one examination was made were receiving a liberal milk and egg diet, and yet the albumin, even

in the far advanced cases, was usually either absent or else present in very small quantities.

Cases Showing Enough Albumin to Register with the Esbach Albuminometer.—During the past year four patients are recorded whose urine contained enough albumin to be estimated with the Esbach albuminometer. Two of the patients died and two left the hospital in an unimproved condition. One of the non-fatal cases showed amyloid casts on one occasion, but this was the only evidence of amyloid disease clinically (No. 3859). One of the fatal cases (No. 3643) exhibited at autopsy a slight grade of amyloid change in the kidneys, though no amyloid casts had been observed in the urine. The urine reports of these cases are as follows:

No. 2956. On admission, 12 : 29 : '04, albumin, sugar, and casts absent; 6 : 4 : '06 sp. gr. 1010, albumin 0.1%, sugar and diazo negative, many granular casts, many leucocytes, a few red blood-cells and epithelial cells; 6 : 14 : '06 sp. gr. 1004, albumin 0.1%, sugar and diazo negative, many hyaline and granular casts, many red blood-cells and leucocytes, some epithelial cells; 10 : 11 : '06 albumin absent; 5 : 8 : '07 sp. gr. 1024, albumin absent, a few granular casts. In this case both apices were involved and possibly one base. He left the hospital in an unimproved condition, on 7 : 8 : '07, and three months later was still alive, though no details as to his condition were obtained.

No. 3859. On admission, 1 : 12 : '05, urine sp. gr. 1014, no albumin, sugar, or diazo, a few hyaline casts. 6 : 8 : '06 sp. gr. 1010, albumin 0.5%, sugar and diazo absent, many hyaline, granular, and quite a number of amyloid casts (reaction with iodine positive), and many epithelial cells and leucocytes. This was an advanced case of tuberculosis with extensive pulmonary involvement. The liver was not enlarged and there were no evidences of amyloid disease except the amyloid casts in the urine. The patient left the hospital 6 : 18 : '06 in an unimproved condition.

No. 3643. On admission, 9 : 15 : '05, urine sp. gr. 1020, no albumin, sugar, or diazo, and the microscope revealed no abnormalities; November, 1905, sp. gr. 1020, albumin a trace, sugar and diazo negative, many granular casts; January, 1906, sp. gr. 1025, a heavy cloud of albumin, sugar and diazo negative, many hyaline casts; 4 : 11 : '06 sp. gr. 1018, albumin a heavy creamy precipitate, sugar and diazo negative, many hyaline casts, a few granular casts; 4 : 30 : '06 total quantity of urine 450 c.c., sp. gr. 1032, albumin 2.6%, innumerable

casts, mostly hyaline, some partly granular; no amyloid casts and no free cellular elements were observed. Patient died 5 : 16 : '06. At autopsy a slight grade of amyloid change was found in the kidneys.

No. 4521. 10 : 11 : '06 urine sp. gr. 1017, no albumin, sugar, or diazo; the specimen was too stale for microscopic examination. 1 : 31 : '07 sp. gr. 1027, albumin 1.1%, sugar negative, diazo very suggestive but not positive, very many hyaline casts, usually long and rather narrow, a very few partly granular casts with a few degenerated cells attached; no amyloid casts were found. An especially interesting feature in the microscopic examination was the very small number of free cellular elements present (Cf. No. 3643). On 2 : 3 : '07 there was 1.0% of albumin and on 2 : 5 : '07 there was 2.0% of albumin present in the urine. The patient died 2 : 7 : '07. The macroscopic diagnosis of the kidney condition at autopsy was marked diffuse nephritis.

No edema at autopsy or previously was at any time recorded in these four cases. Apart from pain in the throat or chest there is no reference to pain in any of these cases, except in one (No. 2956) on one occasion, when there was pain in the back after straining. In the four patients the character of the second aortic sound is recorded on nine occasions, on seven of which there was no accentuation. Two of the patients (Nos. 3859 and 3643) had each a slight degree of accentuation of the second sound at the aortic cartilage on one occasion. Of the two fatal cases, No. 3643 showed numerous ulcers in the small intestine and a few in the large intestine; No. 4521 revealed a few ulcers in the jejunum together with a pseudo-membranous colitis and ulceration in the lower part of the ileum and in the large intestine.

Casts; Their Origin.—Apart from casts of definite cellular origin, such as those composed entirely of epithelial or red blood-cells, there is a large group of casts, like the hyaline, the origin of which is not so clear.

Senator[4] considers that the majority if not all of the hyaline casts are formed chiefly from epithelial cells of the uriniferous tubules. Rovida[5] as long ago as 1867 considered hyaline casts to be the product of the secretion of these cells. As Emerson[22] says, "the very slightly injured epithelial cell still functionating may

secrete a coagulable substance with the formation of casts." Senator considers it possible that the epithelial cells die, "and after being converted into a hyaline substance fuse into the form of casts, a process which appears to be practically established by the microscopic picture, as the same cast frequently shows the various stages of gradual conversion of the epithelial elements into hyaline substance." Another theory, according to Weigert,[4] is that by the death of the epithelial cells a barrier is removed so that the surrounding albuminous fluid may escape into the tubules, where it mixes with necrotic cellular elements to form a coagulum.

There is some question, however, as to whether all hyaline casts under all circumstances indicate an abnormal condition of the epithelial cells. Klieneberger[9] found hyaline casts in large numbers toward the end of life in tuberculosis and other chronic diseases without characteristic parenchymatous changes in the kidneys. He attributed their appearance to agonal disturbances of circulation. Moreover, marked changes in the tubular epithelium are asserted to occur without the appearance in the urine of either albumin or casts.

A small number of observers believe that hyaline casts are produced by the coagulation of albumin in the uriniferous tubules. This theory apparently fails of confirmation in the cases in which numerous casts are found in the absence of albumin and, again, in the cases in which there is a relatively small number of casts and a large amount of albumin.

Probably no single explanation will account for the formation of all hyaline casts, and at various times the various possible causes mentioned may be responsible for their production.

In cases dying of chronic pulmonary tuberculosis at least some portion of the tubular epithelium is almost invariably affected, and this appears to be at least partly responsible for most of the hyaline casts occurring in the urine.

In the fatal cases referred to in this paper no careful histological examination has been made of the kidneys. Kossler[10] reports six

cases of advanced chronic pulmonary tuberculosis in which casts without albuminuria (serum-albuminuria) were observed before death. He found no special inflammation of the kidneys, but degenerative changes in the epithelium of the tubules were common. Coarse granules and marked cloudiness in the protoplasm, partial or complete destruction of the nuclei, in fact, all stages of necrobiosis of cells, and even sometimes absolute necrosis, occurred. The involvement of the epithelium was often focal in character, the same kidneys in some portions showing perfectly intact epithelium. The tubules showed granular coagula, and not infrequently free in the lumina erythrocytes formed into casts. No distinct inflammatory changes of a diffuse or circumscribed character were encountered. Bowman's capsule and the glomerular tufts were found to be little altered, and there never was a dense cell infiltration around the glomeruli. In Walsh's[11] description of the kidneys in tuberculosis the absence of glomerulonephritis and the common involvement of the tubular epithelium are emphasized. These pathological conditions would indicate that the tubules are more concerned than the glomeruli in producing the cast substance.

In a very careful and exhaustive study of the kidney tubules in patients dying of tuberculosis by Walsh,[11] degeneration and necrosis of the epithelium were commonly found. A very interesting additional feature in these cases was the occurrence of hyaline casts, which were found in almost every one of the one hundred pairs of kidneys examined. "Sometimes they were few in number and sometimes did not occur outside of tubercles or fibrous areas, but they were almost constantly present. Hyaline casts were also found in the majority of cases of non-tuberculosis," twenty-six of which were studied by Walsh, "and in all forms of nephritis, and even in the practically normal kidney from the child one week old."

The following results were obtained from analyses of the urine of four patients on the last day of life:

No. 3640. Urine cloudy, flocculent sediment, faintly acid, 1020, 0.4% of albumin, no sugar, diazo positive (green precipitate absent); casts numerous, chiefly hyaline (showing a roughened or very finely granular surface), quite a proportion showing degenerated epithelial cells attached; quite a number of various sized, usually oval or round, granular epithelial cells; quite a number of granular leucocytes.

No. 5039. Urine yellow, some sediment, acid, 1030, trace of albumin (sugar negative the day before death), diazo suggestive; sediment loaded with pale hyaline casts, quite a number exhibiting some granules on their surface and a few epithelial attachments; a few irregularly shaped, round, granular epithelial cells of moderate size.

No. 2923. Urine yellowish-red, cloudy, some flocculent sediment, acid, 1016, a trace of albumin, sugar and diazo negative. The uncentrifuged sediment showed many finely granular casts, a few hyaline casts, and a few epithelial casts; a few swollen, round, vacuolated, degenerated epithelial cells; many squamous epithelial cells and bacteria; no red blood-cells.

No. 4963. Urine, cloudy, smoky, acid, 1022, a trace of albumin, sugar and diazo negative; many granular casts, a few hyaline and hyalo-granular casts, a few epithelial casts, and a few blood casts; a few granular and non-granular epithelial cells; a few leucocytes; many bacteria.

These and other cases elsewhere referred to in this paper demonstrate that hyaline casts, with or without a roughened or slightly granular surface, often appear in much larger numbers during the last stage of tuberculosis, while granular casts, especially of the coarsely granular variety, and other evidences of degeneration of the kidney epithelium, such as cellular elements in the urine, often become less at this time. The increase in the number of hyaline casts and the decrease in the number of granular and cellulo-granular casts and of epithelial cells would indicate that new factors were sometimes at work in the production of casts shortly before death.

The small amount of albumin often associated with these large numbers of casts would speak against their formation from this substance.

Significance of Casts.—Casts, like albumin, may occur under a number of circumstances in the urine of persons whose con-

dition is little or not at all abnormal. They are at times met with in normal infants during the first week of life,[19] and in normal women at some time during pregnancy or parturition.[26] They also occur in a great variety of conditions in which one is apt to find so-called physiological albuminuria.

Considerable judgment is needed in attempting to interpret the significance of the presence or absence of casts in the urine. They may be present when there is no serious kidney lesion. Their most brilliant display, according to Emerson,[23] is in non-nephritic conditions. He asserts that "the cast may be a good index of the present state of the cell, whether merely irritated or totally destroyed, but gives absolutely no clue to the pathological process behind that condition of the cell. The more normal the cells, the better do they seem to form casts when disturbed." Again, the casts may be few in number or absent when the kidneys are seriously diseased.

It must be borne in mind also how easy the detection of casts has been made by the use of the centrifuge, so that too much stress must not be attached to the finding of a few casts after careful centrifugation of the urine.

According to Metzger,[14] "the continued presence of albumin and casts of different varieties after the patient is put at rest and withdrawn from injurious influences speaks for Bright's disease, but are not pathognomonic symptoms and only form one link in the chain of signs and symptoms." Hastings and Hoobler[15] consider that albuminuria with casts is good evidence of nephritis.

Casts in tuberculosis, as in other conditions, may be present at one time and absent at another. Much information is not usually to be obtained by examining only a single specimen of urine.

A variety of reports are met with as to the proportion of cases in which casts are found in pulmonary tuberculosis. Purdy[17] says they are found exceptionally, and chiefly in cases complicated by renal lesions, of which he mentions amyloid disease as the most frequent. According to Norman Bridge,[18] tube casts are

found in only a small proportion of the cases of tuberculosis. He considers that in these cases there is nearly always amyloid degeneration of the kidneys. Walsh[7] found casts in from 25% to 66% of his cases. Landis[20] records the occurrence of casts in twelve of twenty-six cases of miliary tuberculosis.

In three hundred and ninety-eight dispensary and hospital cases examined at the Phipps Institute during the past year one hundred and twenty-nine (32.4%) showed casts. They occurred in association with albumin seventy-two times (18.1%) and alone fifty-seven times (14.3%).

Several authors refer to the variety and number of casts found in tuberculosis. Emerson[21] records that out of six fatal cases of tuberculosis one showed a few casts and one showed many casts some time before death. In these cases only hyaline and granular casts were mentioned.

Klieneberger[9] found in tuberculosis and other chronic diseases toward the end of life numerous hyaline casts in the urine.

Kossler[10] states that in eighteen cases of pretty far advanced pulmonary tuberculosis he found casts of all varieties, sometimes in small, though usually in large numbers, and in some cases constantly, in others only intermittently. Hyaline and granular casts were the rule. The granular casts predominated and showed all degrees of granulation and all kinds of granules. Epithelial casts were nearly always present. These showed sometimes only epithelial attachments, but at others were composed entirely of epithelial cells. In some the main body of the cells as well as their nuclei were very clearly preserved. He traced typical epithelial casts through the various stages of transition to coarsely granular casts, the amount of granulation depending on the degree of granular degeneration in the cell protoplasm. He also found waxy casts, leucocytic casts, and pure red blood casts. In over one-half the cases with pure red blood casts he was able to follow their occurrence over a long time, even up to the end of life. The pure blood casts were usually present in small numbers, but at

times in large numbers. Sometimes they appeared as closely compacted blood-cells; at other times the cells were merely attached in great numbers to hyaline or granular casts.

The commonest varieties of casts we have observed in pulmonary tuberculosis are hyaline, granular, and mixed hyaline and granular casts, the granular being met with more frequently than the hyaline, with the possible exception of the first stage. Hyaline casts in large numbers and in association with few or no granular casts have been met with in a few cases shortly before death, and then their numbers exceeded the numbers of granular casts found in the less advanced cases. The hyaline casts do not usually present a very smooth surface, a few granules being frequently attached or the surface showing in places a distinct roughness. The very pale, almost invisible variety of hyaline cast is infrequent except in very small numbers.

The granular casts exhibit all sizes of granules, which, though fine in the majority of cases, are at times so large that they appear like and probably are degenerated epithelial cells.

The width of the casts in most cases is neither very broad nor very narrow. The width in several cases of casts giving the amyloid reaction has been greater than the average width. Not all casts, however, that resemble amyloid casts on account of their size and shape give the iodine reaction.

Cellular* casts, or casts partly cellular in character, are of very common occurrence in tuberculosis. In the majority of cases, according to my experience, the cells are few in number and are attached to the surface of the cast. These casts with cellular attachments may be of any variety, hyaline, granular, mixed,

* A number of terms are employed in this article to describe cellular casts, all of them, I think, self-explanatory. Thus, a hyalo-epithelial cast means a cast that combines in various degrees the elements of a hyaline and epithelial cast. Usually such a term refers to a hyaline cast to which were attached a few epithelial cells. These cells, of course, are supposed to have taken their origin from the kidneys, and not to be simple extra-renal ac cretions. A partly cellular cast is to be understood to mean a cast combining the characteristics of a cellular cast with those of some other variety, the exact variety of cast not having been mentioned on the records. Such terms are especially important in tuberculosis, in which most of the cellular casts present show only a few cellular attachments.

etc. Any number of cells, of course, may be present on a cast, even to the extent of completely covering it. I have not often met with cellular casts in which I could feel confident that the casts were composed entirely of cells.

The most common variety of cellular cast is the epithelial. Definite leucocytic casts do not often appear, but casts with small cells, either shrunken epithelial cells or leucocytes, are not infrequent. I have failed to meet with blood casts as often as some observers, partly owing, perhaps, to the age of the specimens examined, and partly to my inability to differentiate with absolute certainty the variety of cells present.

The records of one hundred and sixty examinations of urine from tuberculous patients at the Philadelphia Hospital were investigated. Most of the cases were moderately or far advanced. In some instances more than one specimen of urine of the same patient was examined. Casts were recorded forty-four times (27.5%), hyaline casts were specifically mentioned twenty-six times, granular casts twenty-three times, mixed hyaline and granular casts three times, cellular casts once, and in one case the variety of cast was not stated.

Out of thirty-eight dispensary patients at the Phipps Institute casts were recorded twelve times, 31.6%. In all cases the casts were few in number. Hyaline casts were present in all twelve cases, granular casts in five cases, and cellular casts were mentioned only two or three times.

In single specimens of urine taken from fifty-eight patients (forty males and eighteen females) in the wards of the Phipps Institute—all chronic pulmonary cases with tubercle bacilli in their sputum—the following results were obtained in regard to casts. (These cases were also investigated in regard to the occurrence of albumin, *q. v.*) Casts were recorded as present in forty-two cases (72.4%) and as absent in sixteen cases. Among the forty-two cases with casts only one cast was observed in six cases, a few casts in twenty-one cases, a considerable number in

three cases, many in eleven cases, and casts were simply recorded as present in one case.

Hyaline casts were recorded in eighteen cases, granular in twenty-six, and mixed hyaline and granular in eighteen. The granular casts were both coarsely and finely granular, the latter predominating. Cellular or partly cellular casts were recorded in eighteen cases, some of which showed more than one variety of cellular casts; epithelial casts were recorded in three cases (a few in one case, one in another case); partly epithelial casts in ten cases (one cast in three, a few in seven cases); hyalo-epithelial casts in two cases (one cast in one case, a few in the other); a few partly epithelial casts in one case; a few partly erythrocytic casts in one case. Cellular casts without further description are mentioned four times (one cast in two cases, a few in one case, present in one case).

In one patient (No. 4920), a mulatto girl aged seventeen, single, a moderately advanced tuberculous case with slight or moderate fever, who later left the hospital in a slightly improved condition, the urine was examined at various intervals, sometimes at every voiding in the twenty-four hours, during a period of two and a half months, twenty examinations for casts being made. Granular casts were found on all occasions (a few eleven times, considerable numbers eight times, and many once). Partly cellular casts were found eight times, being described as partly epithelial six times (a few casts four times, quite a number twice), and as partly cellular twice, on both these occasions a few partly cellular casts being recorded. Albumin was present in thirteen of the twenty examinations and absent seven times. The test employed for the detection of albumin in this case was the acetic acid, salt solution, and heat test. (This case is also referred to under albuminuria.)

Twelve patients were observed in the last stages of tuberculosis over periods varying from six to one hundred and fourteen days before death, examinations in several cases being made of

specimens of urine voided on the last day of life. The urinary findings were typical of the last stages of pulmonary tuberculosis. Albumin was present in all cases, the amount being described as a trace in about two-thirds and as considerable in one-third. All of the patients showed casts in the urine. In fifty examinations casts were present in forty-nine and were recorded as doubtful in one. One cast is recorded in one examination, a few casts in seventeen examinations, quite a number in eleven, and many casts in twenty.

Hyaline casts were present in the urine of nine of the twelve cases and in twenty-eight of the forty-nine examinations (one cast was present in one of the examinations, a few in twenty-one, quite a number in three, and many in three). Granular casts occurred in all twelve patients and in thirty-seven examinations (in one of the specimens one cast was recorded, in eight a few, in eleven quite a number, and in seventeen many). Mixed hyaline and granular casts were found in nine of the patients and in fourteen of the specimens.

Cellular or partly cellular (usually epithelial) casts occurred in eight of the twelve cases and in twenty-four of the forty-nine specimens of urine. Epithelial casts (casts in which only epithelial cells were visible) were recorded in five patients and in six specimens. A few blood casts were present on one examination. Not uncommonly several varieties of cellular casts would be present in the same specimen.

The amount of albumin and the number of casts in many cases do not run parallel with each other. A patient with 0.1% of albumin may show only a few casts, and another patient, with no albumin, may exhibit many even granular casts. In regard to the absence of albumin when many casts are present, we corroborate the findings of Kossler,[10] who reports eighteen advanced cases with casts, but without serum-albumin in the urine.

A difference in the relative proportion of granular and hyaline casts is sometimes found in certain cases showing large amounts

of albumin, in the final stages of the disease. In four patients shortly before death whose urine on four examinations showed amounts of albumin varying from 0.1% to 2.6% (with the Esbach albuminometer), ten estimations in all being made, the hyaline variety of casts predominated considerably in seven of the examinations, hyaline and granular casts appeared in about equal numbers in two examinations, and many granular casts without any hyaline casts were present in one examination. In all four cases many casts were present on all the examinations. Hyaline casts were spoken of as appearing in quantities in three specimens. One specimen contained many hyaline casts and another was described as loaded with hyaline casts. These findings are in contrast to those of the average bed patients with tuberculosis, in whom, as a rule, granular casts are more common than hyaline casts.

In some cases a gradual change from granular to hyaline casts may be noted in patients whose urine is examined at frequent intervals within a short period of death. Not only do the granular casts become much reduced in number or disappear altogether in some cases shortly before death, but cellular elements may also entirely disappear.

Amyloid Casts.—The infrequence of amyloid casts in pulmonary tuberculosis may be due to the comparative infrequence of amyloid disease of the kidneys in this disease (5% of the cases reported by Walsh[8] and 9.2% of those reported by White[12]).

Only four cases at the Phipps Institute during the past year are recorded as having what were supposed to be amyloid casts in the urine. This number would doubtless have been somewhat larger if patients had received more urinary examinations, or if a greater number of non-suspicious casts had been treated with iodine. Except when the appearance of casts suggested that they might be amyloid, the iodine test was not applied. In two of the cases a positive reaction with iodine is recorded; in the other two

cases the records make no mention of this test, but it was probably performed and with positive results. Amyloid casts were only found on one examination of the urine in each of the four cases.

One of the patients (No. 4006) left the hospital in an improved condition. The clinical diagnosis was tuberculosis of the lungs and amyloid disease of the liver, kidneys, and spleen. Another patient (No. 3859) left the hospital without any improvement in her condition. The liver in this case was not enlarged and there were no evidences of amyloid disease except the casts in the urine.

The remaining two cases died. The autopsy records make no mention of the iodine test in connection with the kidneys, but in one case (No. 3831) the liver showed a slight amyloid reaction, and in the other case (No. 3441) the liver showed a very marked amyloid reaction.

In the specimens of urine containing amyloid casts the specific gravity was always low. In two of the specimens it was 1008, in one it was 1010, and in the remaining one 1012. The amount of albumin was always above the average for tuberculosis, being described in one specimen as a distinct cloud, in two as a heavy cloud, and in one there was 0.5% of albumin. The glucose and the diazo reaction were absent in all four specimens. The number of amyloid casts was recorded as a few in three of the specimens and as quite a number in one. Many granular casts were present in three of the specimens and many partly granular casts in the fourth. In three of the specimens there were many hyaline casts and in one a few. One specimen showed casts partly cellular in character. Amyloid casts occurred ten days before death in one fatal case and twenty-five days before death in the other.

In another case (No. 4224) casts were present of the general appearance of amyloid casts, but failed to give the iodine reaction. At autopsy no amyloid change was detected in the liver or spleen (microscopic examination not yet complete).

Casts without Albumin.—Urine containing casts but no serum-

albumin has been observed in many diseases. This condition may also be met with in cases of apparently slight and temporary irritation of the renal epithelium. At times it may occur normally, as in infants during the first few days of life.

Among a long list of causes of casts without albumin Emerson[24] mentions tuberculin injections and pulmonary tuberculosis. Kossler[10] reports eighteen cases in which casts without albumin occurred, large numbers and all varieties of casts being seen. (He employed the acetic acid and potassium ferrocyanide test.)

We have seen many casts, chiefly granular and partly cellular, in quite a number of cases in which albumin was absent. In one case (No. 4920) the urine of which contained casts in all of twenty examinations albumin occurred thirteen times (test, salt solution, heat, and acetic acid).

Among one hundred and twenty-seven house cases at the time of admission twenty-six (20.5%) showed casts but no albumin. (In sixty-nine of these cases the test for albumin was heat and acetic acid; in fifty-eight it was salt solution, heat, and acetic acid. These cases are also referred to under "albuminuria.")

Among three hundred and ninety-eight cases at the time of admission, comprising both house and dispensary cases, 14.3% had casts but no albumin (test, heat and acetic acid).

Thus there was a greater proportion of cases showing casts without albumin among the house cases at the time of admission than among both house and dispensary cases at the time of admission. In other words, more of the house cases than of the dispensary cases at the time of admission show casts without albumin. This does not apply, however, to the house cases admitted in the last few weeks of life, because, according to our statistics, cases in the last stages of the disease nearly always have both casts and albumin in the urine.

We believe that the constant occurrence of fairly large numbers of casts in tuberculosis, even when albumin is absent or present in

small amounts, is of bad prognostic omen. Casts are constantly present in most cases for a few weeks before death, and in many cases for several months before death. A moderately advanced case (No. 4920), already referred to, who left the Phipps Institute in a slightly improved condition, being well-nourished and almost afebrile, but whose urine, examined over a period of several months, had always contained casts in small or considerable numbers, was seen about five months later in another hospital in a far advanced stage of the disease.

The constant absence of casts, on the other hand, we believe indicates to a certain extent a favorable prognosis.

Casts are also of value in diagnosis. The best evidence of nephritis in tuberculosis, according to Walsh,[16] is the occurrence of hyaline and granular casts in the urine.

Cylindroids.—Typical cylindroids are quite frequently met with in tuberculosis, usually in small, but occasionally in large numbers. At times there are a great many forms giving the appearance of a cylindroid through a portion of their extent and elsewhere of a typical cast.

Occasionally objects are observed resembling hyaline casts in many respects, but differing from the average hyaline cast in being very much longer; moreover, when the urine is slightly agitated these forms are seen to bend with great pliability, and present no evidences of brittleness. An illustration of objects of this description appears in von Jaksch's "Clinical Diagnosis,"[8] where they are described by him as cylindroids. I have not observed in these structures the branching which is typical of the mucous casts described by Tyson.[1]

Another object occasionally encountered, not peculiar to tuberculosis, resembles a hyaline cast, but is much shorter and narrower than the average hyaline cast, and possesses a much more delicate and less solid appearance. It is seen with some difficulty. It may be a true cast or a mould of a small glandular duct.

The Occurrence of Albuminuria and Casts in Relation to

Diseases of the Gastro-intestinal Tract.—Affections of the gastro-intestinal tract and of the kidneys are often associated in the same individual, sometimes independently of each other, sometimes in an interdependent relation. In the latter case either the kidneys may give rise to symptoms or disease in the gastro-intestinal tract, or else some abnormal condition of the gastro-intestinal tract may produce symptoms referable to the kidneys or actual disease in these organs.

Intestinal disease, according to Nothnagel,[3] may give rise to albumin and casts in the urine, more especially to casts. As causative factors in the production of albumin and casts he mentions: simple intestinal catarrh, copious intestinal evacuations following each other in rapid succession, acute gastro-intestinal catarrh, cholera nostras and Asiatic cholera, acute and subacute intestinal affections combined with obstinate constipation, strangulated hernia, and volvulus. In these cases circulatory changes whereby the nutrition of the kidneys is interfered with, and the effects of toxins on the kidneys, are considered to be the factors in the production of casts and albumin in the urine.

Flick and Walsh[25] have reported eleven cases of tuberculosis in which diarrhea occurred without ulceration of the bowels or other apparent cause except nephritis.

We have been unable to find any constant relationship between the amount of ulceration of the intestinal tract as observed at autopsy in cases of chronic pulmonary tuberculosis, and the amount of albuminuria or the number of urinary casts.

We have compared the intestinal condition in regard to ulceration with the amount of albumin present in the urine in thirty-three cases of chronic pulmonary tuberculosis. As far as we may judge from so small a number of cases, the figures seem to indicate that in the majority of instances the greater the number of intestinal ulcers, the greater the amount of albumin in the urine. The thirty-three cases have been divided into two classes: first, those showing only a few or no ulcers (sixteen cases); second,

those showing more than a few ulcers (six cases) or many ulcers (eleven cases), making seventeen cases in all in the second class. The cases have also been divided, in regard to the amount of albuminuria, into those showing rarely more than a trace, and those showing an amount greater than a trace. In the sixteen cases with few or no ulcers three showed more than a trace of albumin, 18.8%; in the seventeen cases with more than a few or with many ulcers six showed more than a trace of albumin, 35.3%.

We believe that intestinal ulceration at times affects the kidneys so that albumin and casts appear in the urine.

In order to determine if any light might be thrown on the interrelationship between a number of clinical symptoms and of certain conditions existing in tuberculosis on the one hand, and on the other hand the occurrence of albumin and casts in the urine, the following statistical study has been undertaken. In such an investigation it must be borne in mind, first, that urinary abnormalities and other clinical symptoms are prone to become more marked as the tuberculosis progresses, so that it is difficult to trace any direct interdependence between an aggravation of symptoms and an increase in the amount of albumin or in the number of casts found in the urine. In the second place, a variety of clinical symptoms may be present in the same individual, and there may be great difficulty in establishing a connection between any one of such symptoms and the abnormalities found in the urine.

In the tables presented the presence and the absence of certain symptoms and the occurrence of certain conditions are compared with the presence or absence of albumin and casts. A fourfold division has been made of the urinary findings: first, into the cases with neither albumin nor casts in the urine; second, into those with albumin alone; third, those with casts alone; and fourth, those with both albumin and casts in the urine.

Some of the tables are not given in full, only the more important figures being presented.

In the first group of tables certain symptoms directly or

indirectly associated with the gastro-intestinal tract, anorexia, gastric disturbance, constipation, and diarrhea are compared with the presence or absence of casts in the urine. A similar table has been made in regard to the cases in which intestinal involvement was diagnosed clinically, a diagnosis made often on the amount and persistence of diarrhea.

DIARRHEA IN RELATION TO ALBUMIN AND CASTS.

Urine examined for albumin and casts, 398..	Diarrhea present, 59	Albumin and casts absent,.....	26 (44.1%)
		Albumin alone present,.....	8 (13.6%)
		Casts alone present,.....	6 (10.2%)
		Albumin and casts present,.....	19 (32.2%)
	Diarrhea absent, 339	Albumin and casts absent,.....	175 (51.6%)
		Albumin alone present,.....	60 (17.7%)
		Casts alone present,.....	51 (15.0%)
		Albumin and casts present,.....	53 (15.6%)

According to this table, urinary abnormalities occur more frequently in the cases with diarrhea than in those without diarrhea. Both albumin and casts in association were present twice as often in the cases with diarrhea as in those without diarrhea.

This table may also be studied from the standpoint of the urine. Thus in two hundred and one cases with neither albumin nor casts in the urine twenty-six had diarrhea, 12.9%; in sixty-eight cases with albumin alone, eight had diarrhea, 11.8%; in fifty-seven with casts alone, six had diarrhea, 10.5%; in seventy-two cases with both casts and albumin in the urine nineteen had diarrhea, 26.4%. In other words, diarrhea occurred twice as often in cases showing both albumin and casts as in those showing neither albumin nor casts.

INTESTINAL INVOLVEMENT ACCORDING TO CLINICAL DIAGNOSIS IN RELATION TO ALBUMIN AND CASTS.

Urine examined for albumin and casts, 398..	Intestines involved, 20 ...	Albumin and casts absent,.....	4 (20 %)
		Albumin alone present,.....	4 (20 %)
		Casts alone present,.....	0 (0 %)
		Albumin and casts present,.....	12 (60 %)
	Intestines not involved, 213	Albumin and casts absent,.....	117 (55.0%)
		Albumin alone present,.....	37 (17.3%)
		Casts alone present,.....	33 (15.5%)
		Albumin and casts present, ...	26 (12.2%)
	Intestinal involvement not recorded,.....		165

In those cases in which the intestines were diagnosed clinically as involved, 80% showed urinary abnormalities; in those not involved, only 45% showed these abnormalities. Again, both casts and albumin were found in 60% of cases with intestinal involvement and in only 12.2% of cases without intestinal involvement.

If we compare the one hundred and twenty-one cases in which both albumin and casts were absent with the thirty-eight cases in which both albumin and casts were present, we find that intestinal involvement occurred only four times among the former (3.3%), and twelve times among the latter (31.6%).

Anorexia.—In one hundred and ninety-nine cases in which anorexia was present 51.8% showed urinary abnormalities and 18.1% both casts and albumin. In one hundred and ninety-seven cases in which anorexia was absent 47.2% showed urinary abnormalities and 17.8% both albumin and casts. In two hundred cases with neither albumin nor casts in the urine 48% had anorexia, and in seventy-one cases with both casts and albumin 50.7% had anorexia. The differences here noted are very slight.

Gastric Disturbances.—This term includes such symptoms as vomiting, nausea, and eructation of gas from the stomach. No striking differences are to be noted in the urinary findings in the presence or absence of gastric disturbances. In two hundred and nineteen cases in which gastric disturbance was recorded as present albumin or casts occurred in 51.6%, and both albumin and casts in 19.6%. In one hundred and seventy-six cases in which this symptom is stated to have been absent urinary abnormalities occurred in 47.2%, and both albumin and casts in 15.9%. In one hundred and ninety-nine cases with neither casts nor albumin in the urine 53.3% had gastric disturbance, and in seventy-one cases with both casts and albumin 60.6% had gastric disturbance.

Constipation.—The urinary findings do not vary much whether constipation is present or absent, but albumin and casts occurred slightly more frequently in our statistics with the latter. In one

hundred and twelve patients with constipation 44.6% showed urinary abnormalities and 14.3% both casts and albumin; in two hundred and eighty-six cases without constipation (exclusive of cases of diarrhea) 51.4% showed urinary abnormalities and 19.6% both casts and albumin. In the one hundred and seventy-five cases with neither albumin nor casts in the urine 35.5% had constipation; and of fifty-three cases with both casts and albumin only 30.2% had constipation.

AGE IN RELATION TO ALBUMIN AND CASTS.

Urine examined for albumin and casts, 398..

Under ten years, 3.....	Albumin and casts absent,.....	1 (33.3 %)
	Albumin alone present,.....	1 (33.3 %)
	Casts alone present,.....	0 (0.0 %)
	Both albumin and casts present,...	1 (33.3 %)
Ten to twenty years, 70....	Albumin and casts absent,.....	36 (51.4 %)
	Albumin alone present,.....	17 (24.3 %)
	Casts alone present,.....	6 (8.6 %)
	Both albumin and casts present,...	11 (15.7 %)
Twenty to thirty years, 111...	Albumin and casts absent,.....	58 (52.3 %)
	Albumin alone present,.....	18 (16.2 %)
	Casts alone present,.....	15 (13.5 %)
	Both albumin and casts present,...	20 (18.0 %)
Thirty to forty years, 120..	Albumin and casts absent,.....	58 (48.3 %)
	Albumin alone present,.....	18 (15.0 %)
	Casts alone present,.....	25 (20.8 %)
	Both albumin and casts present,...	19 (15.8 %)
Forty to fifty years, 64....	Albumin and casts absent,.....	34 (53.1 %)
	Albumin alone present,.....	12 (18.75 %)
	Casts alone present,.....	4 (6.25 %)
	Both albumin and casts present,...	14 (21.9 %)
Over fifty years, 30.....	Albumin and casts absent,.....	14 (46.7 %)
	Albumin alone present,.....	2 (6.7 %)
	Casts alone present,.....	7 (23.3 %)
	Both albumin and casts present,...	7 (23.3 %)

It is unfortunate that in the age periods in which the urinary abnormalities are most striking we have the smallest number of cases on which to base percentages. Albumin appeared in the largest number of cases in the period under ten years. In the period over fifty years occurs the greatest proportion of cases with casts in the urine, 46.6%. Albumin, however, appears least often at this period, namely, in only 30.0% of cases. The period in which casts occurred next in frequency was between thirty and

forty, namely, in 36.6% of cases. The next highest percentage for casts was 33.3%, which occurred under ten years, the period at which albumin was found most frequently.

We have combined last year's table, in which three hundred and seventy-nine cases were studied in regard to the presence or absence of albumin at various age periods, with the three hundred and ninety-eight cases of the present year, giving seven hundred and seventy-seven cases from which to draw conclusions.

SUMMARY FOR TWO YEARS IN REGARD TO THE RELATION OF AGE TO ALBUMINURIA.

Urine examined for albumin, 777	Under ten years, 9	With albuminuria,	5	(55.6 %)
		Without albuminuria,	4	(44.4 %)
	Ten to twenty years, 129	With albuminuria,	44	(34.1 %)
		Without albuminuria,	85	(65.9 %)
	Twenty to thirty years, 234	With albuminuria,	72	(30.8 %)
		Without albuminuria,	162	(69.2 %)
	Thirty to forty years, 226	With albuminuria,	74	(32.7 %)
		Without albuminuria,	152	(67.3 %)
	Forty to fifty years, 125	With albuminuria,	41	(32.8 %)
		Without albuminuria,	84	(67.2 %)
	Over fifty years, 54	With albuminuria,	20	(37.04 %)
		Without albuminuria,	34	(62.96 %)

The greatest percentage of cases with albuminuria is found in the period under ten years (55.6%). This holds true for the separate tables as well as for the combined table. This is one of the periods of life, however, in which physiological albuminuria is apt to occur. The other periods show no marked difference, the highest percentage among them occurring in the period over fifty years (37.04%), and the lowest percentage between twenty and thirty years (30.8%).

SEX IN RELATION TO ALBUMIN AND CASTS.

Urine examined for albumin and casts, 398	Males, 247	Albumin and casts absent,	122	(49.4%)
		Albumin alone present,	31	(12.6%)
		Casts alone present,	43	(17.4%)
		Both albumin and casts present,	51	(20.6%)
	Females, 151	Albumin and casts absent,	79	(52.3%)
		Albumin alone present,	37	(24.5%)
		Casts alone present,	14	(9.3%)
		Both albumin and casts present,	21	(13.9%)

It will be seen from this table that albumin (including the cases in which albumin alone was present and those in which both albumin and casts were present) occurred in 33.2% of the males and in 38.4% of the females. Since cellular elements are more frequent in the urine of females than of males, nucleo-albumin as well as serum-albumin may have occurred more frequently in the female sex. (The test employed was heat and acetic acid.) Casts, however, occurred in 38.0% of the males and in only 23.2% of the females. Moreover, both albumin and casts were found in 20.6% of the males and in only 13.9% of the females. This difference is partly explained by the more marked cellular and bacterial content of the female urine, rendering the discovery of casts difficult. Probably, however, some grade of nephritis, or at least of some temporary abnormality of the kidneys, was more frequent in the male sex and partly accounted for the greater number of males with casts and with both albumin and casts.

Combining last year's statistics with this table, we find that albuminuria occurred in 32.8% of four hundred and sixty males and in 33.1% of three hundred and seventeen females.

According to Walsh,[6] "all kinds of nephritis are equally common to both sexes except chronic interstitial nephritis and ulcerative tuberculosis." Among one hundred and one tuberculous cases (sixty-seven males and thirty-four females) Walsh found chronic general interstitial nephritis in eleven cases, all of them in males.

Edema.—According to our statistics, in fifty-three cases with edema 49.1% had albumin or casts or both, and 20.8% had both casts and albumin. In three hundred and forty-one cases in which edema was absent 49.3% had urinary abnormalities and 17.9% both albumin and casts. Combining last year's statistics with the present figures, we find that in one hundred and fifteen cases with edema 36.5% showed albumin, while among six hundred and fifty-eight cases without edema 32.1% showed albumin. Among two hundred cases with neither albumin nor casts

13.5% had edema, while out of seventy-two cases with both albumin and casts 15.3% had edema.

These figures indicate how little special relationship exists between edema and the occurrence of albumin and casts in the urine, and suggests that the edema that is found in tuberculosis does not depend primarily on nephritis. Probably cardiac failure has much more to do with the appearance of edema in this disease. Edema is usually a late manifestation of tuberculosis and is generally slight in amount. It is seen most often in the lower extremities and rarely in the face.

In six cases (not all of the present year) in which the amount of albumin in the urine could be estimated with the Esbach albuminometer (the amounts varying from 0.1% to 2.6%) only one showed edema. The records in regard to the edema are taken from the previous history of the cases (this being recorded in five), from the condition on admission (recorded in all), and from the autopsy notes (recorded in the three cases that died). The greatest amount of albumin recorded at any time in the case with edema was 1.5%. The edema in this case was more in amount than is ordinarily seen in cases of chronic pulmonary tuberculosis, but was not marked. The edema did not extend above the knees. Of the six cases mentioned, the one with edema and two of the others died. Two left the hospital unimproved, one left slightly improved.

Accentuation of the Second Aortic Sound.—One of the fairly frequent symptoms in nephritis is accentuation of the second aortic sound. Where, however, as in pulmonary tuberculosis, the nephritis is often a local expression of the general advance of the disease, becoming more marked toward the end of life, one would expect the character of the second aortic sound under such circumstances to be influenced to a great extent by factors residing chiefly outside of the kidneys. The weakness of the cardiac muscle and the low blood-pressure occurring in the late stages of tuberculosis contribute to weakness of all the cardiac sounds.

Norris[5] reports evidences of nephritis from examination of the urine in twenty-one out of two hundred and ten cases of tuberculosis with accentuation of the second aortic sound (10%).

In four cases with large amounts of albumin in the urine (0.1 to 2.6% of albumin with the Esbach albuminometer) two showed no accentuation of the second aortic sound on three examinations; two had only a slight accentuation, one of these cases exhibiting the symptom only once in two examinations, the other only once in four examinations. Another patient showed casts constantly and albumin frequently, even as much as 0.1% on two occasions, and yet never presented more than a very slight increase in the second sound at the aortic cartilage.

Our table shows a distinct preponderance of urinary abnormalities in the cases with an accentuated second aortic sound in comparison with the cases in which this symptom was absent. Thus, in one hundred and twenty-nine cases with accentuation of the aortic second sound 57.4% had urinary abnormalities and 20.9% had both casts and albumin; in two hundred and sixty-seven with this symptom absent urinary abnormalities occurred in 46.1% and both casts and albumin in 16.9%. In one hundred and ninety-nine cases with neither albumin nor casts 27.6% showed an accentuated second aortic sound, and in seventy-two cases with both albumin and casts in the urine 37.5% showed an accentuated second aortic sound.

Arteriosclerosis.—Arteriosclerosis is frequently found in association with disease of the kidneys and also with evidences of albumin or casts in the urine. In our table we find that albumin or casts or both occurred in 59.1% of one hundred and seventy-six cases with arteriosclerosis as compared with 40.8% of two hundred and eighteen cases without arteriosclerosis; and that in the cases with arteriosclerosis both albumin and casts appeared about twice as often (24.4%) as in the cases without arteriosclerosis (12.4%). Moreover, in two hundred and one cases with neither albumin nor casts in the urine 35.8% had arteriosclerosis, while in seventy-two cases with both albumin and casts 67.1% had arteriosclerosis.

Specific Gravity.—The specific gravity is one of the most important elements in a urinary examination, but its value depends to a considerable extent on a knowledge of certain other factors in regard to a patient, such as the amount of food and drink he consumes, the amount of urine voided, the degree of his activity, etc. It is best to have a portion of the twenty-four hours' specimen when estimating the specific gravity.

Our examinations were made with specimens from single voidings, and usually at the time of admission to the hospital or dispensary. In two hundred and forty-five cases with a specific gravity at or above 1018, 16.7% had casts alone and 20.8% had both albumin and casts. In one hundred and eighteen cases with the specific gravity below 1018, 10.1% had casts alone and 13.6% had both albumin and casts. Specimens with a specific gravity at or above 1018 usually mean a smaller output of urine, which would tend to concentrate the casts. Moreover, the higher readings in regard to the specific gravity are more common in the advanced cases than in the earlier ones.

Albumin alone was observed in 28.0% of the cases with a specific gravity below 1018, and in 10.6% of the cases with a specific gravity at or above 1018. This difference is at least partly to be explained by the reaction of nucleo-albumin to the heat and acetic acid test, this substance being more readily thrown out in urines of a low specific gravity on account of the smaller proportion of sodium chloride present.

TUBERCLE BACILLI IN SPUTUM IN RELATION TO ALBUMIN AND CASTS.

Urine examined for albumin and casts, 398..	Tubercle bacilli present in sputum, 271 .	Albumin and casts absent,.....	120	(44.3%)
		Albumin alone present,.....	46	(17.0%)
		Casts alone present,.....	47	(17.3%)
		Both albumin and casts present,...	58	(21.4%)
	Tubercle bacilli absent in sputum, 101 .	Albumin and casts absent,.....	67	(66.3%)
		Albumin alone present,.....	16	(15.8%)
		Casts alone present,.....	9	(8.9%)
		Both albumin and casts present,...	9	(8.9%)
	No record of sputum examination,.....		26	

Urinary abnormalities were present in a considerably larger proportion of the cases with tubercle bacilli in the sputum than of those without tubercle bacilli in the sputum. This difference is more apparent in the cases in which both albumin and casts or casts alone were found than in those in which albumin alone was found. In one hundred and eighty-seven cases with neither albumin nor casts in the urine 64.2% had tubercle bacilli in the sputum, while in sixty-seven cases with both albumin and casts in the urine 86.6% had tubercle bacilli in the sputum.

If the tubercle bacilli and their products act in these cases directly on the kidneys it would seem that the effects are felt more by the cast-forming elements, the tubular epithelium, than by the cells especially concerned in the elimination of albumin, namely, the cells entering into the formation of the glomeruli.

Other agents also are often present, in cases in which tubercle bacilli occur in the sputum, and probably exert a deleterious action on the kidneys.

COMPARISON OF ALBUMIN AND CASTS WITH AMOUNT OF PULMONARY INVOLVEMENT.

Urine examined for albumin and casts, 398..	One lung involved, 72 ...	Albumin and casts absent,.....	51	(70.8%)
		Albumin alone present,.....	10	(13.9%)
		Casts alone present,.....	8	(11.1%)
		Both albumin and casts present,...	3	(4.2%)
	Two lungs involved, 179 ..	Albumin and casts absent,.....	84	(46.9%)
		Albumin alone present,.....	23	(12.8%)
		Casts alone present,.....	30	(16.8%)
		Both albumin and casts present,...	42	(23.5%)
	Not recorded, ...		147	
Urine examined for albumin and casts in specially advanced cases, 119.....	Three lobes involved, 59 ...	Albumin and casts absent,.....	31	(52.5%)
		Albumin alone present,.....	6	(10.2%)
		Casts alone present,.....	12	(20.3%)
		Both albumin and casts present,...	10	(16.9%)
	Over three lobes involved, 60 ...	Albumin and casts absent,.....	21	(35.0%)
		Albumin alone present,.....	8	(13.3%)
		Casts alone present,.....	10	(16.7%)
		Both albumin and casts present,...	21	(35.0%)

These figures show how urinary abnormalities increase with

the increase in the amount of pulmonary involvement. In the majority of cases this is the equivalent of saying that urinary abnormalities increase with the advance of the tuberculosis in the lungs.

It will be noted that where only one lung was diagnosed as involved only 4.2% of the cases showed both casts and albumin, whereas in the cases with over three lobes involved 35.0% showed both casts and albumin. Where only one lung was involved 15.3% of the cases had casts, and where there were over three lobes involved 51.7% of the cases had casts. The differences in regard to albumin were less marked; thus, 18.1% of the cases with one lung involved, 36.3% of the cases with two lungs involved, 27.1% of the cases with three lobes involved, and 48.3% of the cases with more than three lobes involved showed albumin.

COMPARISON OF ALBUMIN AND CASTS WITH THE RESULTS OF CASES.

Urine examined for albumin and casts, 398..	Cases arrested or improved, 127.....	Albumin and casts absent,.....	79	(62.2%)
		Albumin alone present,.....	18	(14.2%)
		Casts alone present,.....	16	(12.6%)
		Both albumin and casts present,...	14	(11.0%)
	Cases unimproved, 101..	Albumin and casts absent,.....	47	(46.5%)
		Albumin alone present,.....	15	(14.9%)
		Casts alone present,.....	15	(14.8%)
		Both albumin and casts present,...	24	(23.8%)
	Cases that died, 33	Albumin and casts absent,.....	3	(9.1%)
		Albumin alone present,.....	7	(21.2%)
		Casts alone present,.....	5	(15.2%)
		Both albumin and casts present,...	18	(54.5%)
	Cases with result not recorded,.....		137	

This table gives a very striking picture of how the occurrence of albumin and casts increases in frequency as the cases become more advanced. This difference is much more marked in those cases showing both albumin and casts in the urine than in those cases showing either albumin alone or casts alone. Both casts and albumin occurred in only 11% of the improved and arrested cases; while they occurred in 23.8% of unimproved cases and in 54.5% of the cases that died.

It is also interesting that among one hundred and twenty-nine cases with neither albumin nor casts in the urine 61.2% were recorded disease arrested or improved and 2.3% died, while among fifty-six cases with both albumin and casts in the urine 25.0% were recorded disease arrested or improved and 32.1% died.

(The cases here referred to were all admitted during the current year, and the results have reference to the condition of these patients at the end of the year.)

Somewhat similar figures in regard to pulmonary tuberculosis are given by Wilson Fox.[13] He records that in sixty-one acute cases and forty-two chronic cases dying in hospital albuminuria occurred in the former in 8% and in the latter in 33%, while in eighty-four cases admitted but not dying albuminuria occurred in only 3%.

Comparison of Albumin and Casts with the Duration of the Tuberculosis in the Lungs.—We have compared the urinary findings in one hundred and ninety-eight cases giving a history of having had the disease for periods less than five years with the findings in ninety-four cases in which the disease had existed more than five years. In the cases of under five years' duration 34.2% had albumin (alone 19.8%, combined with casts 14.4%). In the cases of over five years' duration only 24.5% had albumin (alone 9.6%, combined with casts 14.9%). Combining last year's table with that of this year, we find that among five hundred and eighty-seven patients in whom the disease had lasted less than five years albuminuria occurred in one hundred and ninety-three (32.9%); and among one hundred and eighty-four with a duration over five years albuminuria occurred in sixty-three (34.2%).

In the cases of under five years' duration only 30.8% had casts (14.4% alone, 16.4% in combination with albumin), while in the cases of more than five years 39.4% had casts (alone 14.9%, in combination with albumin 24.5%). This difference may be due in part to the more prolonged action of tubercle bacilli or of

their toxins or of other injurious agents upon the tubular epithelium of the kidneys. It may in part be due to the fact that the cases in which the disease has existed longest are often older than the others, a possibility suggested by the not uncommon appearance of a few casts in the urine in people of advancing years. Such a supposition, however, is not substantiated by our statistics in regard to age and the occurrence of casts.

The fact that the cases of over five years' duration do not show a greater proportion of abnormalities in the urine seems to indicate that the kidney condition is to a certain extent an index of the pulmonary condition for the time being, and improves or becomes worse along with the pulmonary condition.

CONCLUSIONS.

Albumin is present in about one-third of the cases of pulmonary tuberculosis coming to the Phipps Institute dispensary and hospital. (These consist mostly of moderately and far advanced cases.) In about one-half of these cases of albuminuria the albumin occurs in association with casts. Albumin is present in about one-half the hospital cases at the time of admission. It is present in nearly all specimens in the last few weeks of life, and in all cases during the last few weeks of life that we have especially investigated.

The amount of albumin in the majority of patients with albuminuria, even of those patients in the last few weeks of life, is only a trace. Only exceptionally do patients have enough albumin to be estimated with the Esbach albuminometer, but as much as 2.6% has been observed.

Marked variations in the amount of albumin may occur during the twenty-four hours. In one case specially studied the largest amounts of albumin found occurred between 12 M. and 6 P. M., and the smallest amounts between 12 P. M. and 6 A. M.

Albumin in large amounts is rare in tuberculosis unless in association with casts or with pus or blood.

Albumin in large amounts occurred more frequently in cases in which the autopsy revealed many intestinal ulcers than in those with few or no ulcers.

The occurrence of albumin and casts in the urine of tuberculous patients at the Phipps Institute is apparently independent of any dietetic treatment.

Urinary casts, like albumin, are present in about one-third of the cases of pulmonary tuberculosis at the Phipps Institute at the time of admission. In a little over half of these cases with casts albumin is also present; in the remainder it is absent. Casts are present in about three-fourths of the hospital cases at the time of admission. (Albumin occurred in only about one-half of these cases.) In all cases during the last few weeks of life, and in nearly all specimens, casts, like albumin, were present.

In cases with casts in the urine one cast may be present or many. Very large numbers are seen chiefly in cases of marked nephritis and in patients during the last few days of life. Many casts at times occur in the absence of albumin.

Any variety of cast may be found in tuberculosis. The commonest varieties in our experience are the granular and hyaline, and mixed hyaline and granular. In advanced cases we have observed the granular cast more often than the hyaline. Casts showing cells are nearly as frequent in advanced cases as are the hyaline. These casts for the most part show only a few cellular attachments. In some cases in the last few days of life large numbers of hyaline casts make their appearance, while granular casts and free cellular elements are very few in number or entirely absent. These large numbers of hyaline casts are present at times in association with only a trace of albumin, at others with a considerable amount.

Leucocytic casts, in the sense of casts composed entirely of leucocytes are rare in my experience. When they appear as attachments to casts it is often difficult to differentiate them from epithelial cells. Red blood casts have been observed only a few times.

Amyloid casts were observed in the urine of four cases in the course of the year. Two of these cases ended fatally, and in each the liver at autopsy revealed amyloid change. The specific gravity in the four specimens of urine was never above 1012, the albumin was always considerable in amount, and casts were always numerous. Sugar and diazo reactions were absent.

We believe that the constant presence of fairly large numbers of casts in the urine in pulmonary tuberculosis is of unfavorable prognostic import; and that the constant absence of casts is of rather favorable prognostic import.

The occurrence of both albumin and casts in the urine is of more significance, as a rule, than either of these findings alone. Both albumin and casts, however, at times occur to quite a marked degree in patients who show no other symptoms than those exhibited by many patients who have little or no albumin, and few or no casts.

Albumin and casts in the urine usually become more marked as the disease progresses, and often diminish or disappear when the patient's condition improves.

Albumin and casts in pulmonary tuberculosis are not often associated with other evidences of nephritis.

Albumin and casts in tuberculosis are more frequent in association with certain symptoms and conditions than with others, though it is often impossible to tell how much they depend on these conditions. They occur considerably more frequently than usual in cases of diarrhea, intestinal involvement (diagnosed clinically), and arteriosclerosis; also in cases with a urinary specific gravity over 1018, with tubercle bacilli in the sputum, and in progressive cases or cases showing extensive pulmonary involvement. In cases with anorexia, gastric disturbance, accentuated second sound at the aortic cartilage, and edema, albumin and casts occur a little more frequently than in cases not presenting these symptoms.

Albumin occurs most frequently in the period under ten years and casts in the period over fifty years.

Casts alone and casts in association with albumin occur considerably more often in the male than in the female sex. Albumin, according to the combined statistics of the last and the current year, appears in only a very slightly larger proportion of males than of females.

REFERENCES.

1. Tyson: "Pract. Exam. of Urine," 1891, p. 220.
2. Nothnagel: Encycl. Pract. Medicine, "Diseases of the Intestines and Peritoneum," second ed., Amer. trans., 1907, p. 172.
3. von Jaksch, Rovida: "Clinical Diagnosis," 1905, p. 304.
4. Senator: Nothnagel, Encycl. Pract. Medicine, Amer. ed., 1905, vol. xi, p. 49.
5. Norris, G. W.: Second Annual Report, Henry Phipps Institute, p. 240.
6. Walsh: Third Annual Report, Henry Phipps Institute, p. 252.
7. Ibid., p. 357.
8. Ibid., p. 245.
9. Klieneberger, Cornet: "Tuberculosis," second ed., p. 634.
10. Kossler: Berl. klin. Woch., Bd. xxxii, S. 296, 1895.
11. Walsh: Transactions Second Ann. Meeting, Nat. Assoc. for Study and Prev. of Tuberc.
12. White: Third Annual Report, Henry Phipps Institute, p. 205.
13. Fox, Wilson: "Diseases of the Lungs and Pleura," 1891, p. 826.
14. Metzger: N. Y. Med. Jour., July 28, 1906.
15. Hastings and Hoobler: Amer. Jour. Med. Sciences, Feb., 1907, p. 264.
16. Walsh: Second Annual Report, Henry Phipps Institute, p. 234.
17. Purdy, C. W.: "Practical Urinalysis and Urinary Diagnosis," 1901, p. 355.
18. Bridge, N.: "Tuberculosis," 1903, p. 97.
19. Holt: "Diseases of Infancy and Childhood," 1905, p. 640.
20. Landis: "A Study of the Autopsy Findings in Twenty-six Cases of Miliary Tuberculosis," read at the Phila. Col. of Phys., Feb. 11, 1907.
21. Emerson, C. P.: Jour. Amer. Med. Assoc., vol. xlvi, p. 12.
22. Ibid., p. 8.
23. Ibid., p. 95.
24. Emerson, C. P.: "Clinical Diagnosis," 1906, p. 265.
25. Flick and Walsh: Transactions First Ann. Meeting, Nat. Assoc. for the Study and Prev. of Tuberc.
26. Brown: Jour. Amer. Med. Assoc., vol. xlvi, p. 85.

C. M. MONTGOMERY.

LARYNGOLOGICAL WORK.

- Total number of cases examined, 227.
  - Tuberculous, 210,.....
    - Tuberculosis of upper respiratory tract, 58...
      - Tuberculosis of larynx,.. 56
      - Tuberculosis of larynx and tongue,..... 1
      - Tuberculosis of larynx and faucial tonsils,.... 1
    - No tuberculosis of upper respiratory tract, ...152
  - Non-tuberculous, 17

SUMMARY FOR FOUR YEARS.

- Total number of cases examined, 907
  - Tuberculous, 858,.....
    - Tuberculosis of upper respiratory tract, 289, ...
      - Tuberculosis of larynx, 274..
        - Diagnosis positive,..239
        - Diagnosis not positive,.... 35
      - Tuberculosis of nasal septum, 1
      - Tuberculosis of pharynx, ... 3
      - Tuberculosis of faucial tonsil, 1
      - Tuberculosis of pharynx, tonsils, and larynx,..... 1
      - Tuberculosis of pharyngeal tonsil,..... 4
      - Tuberculosis of larynx and faucial tonsil,..... 2
      - Tuberculosis of larynx and pharyngeal tonsil,..... 1
      - Tuberculosis of larynx and pharynx,..... 1
      - Tuberculosis of larynx and tongue,..... 1
    - No tuberculosis of upper respiratory tract,.....569
  - Non-tuberculous, 49

LOCATION OF LESIONS IN THE LARYNX.

Arytenoid of one side,.....	1
Arytenoid and ventricular band of one side,.....	2
Arytenoid, ventricular band, and vocal cord of one side,.....	3
Arytenoid and aryteno-epiglottic fold of one side,.....	1
Ventricular band of one side,.....	3
Ventricular bands, both sides,.....	3
Ventricular band and vocal cord of one side,.....	1
Arytenoids of both sides,.....	6
Arytenoids of both sides and space between them,.....	3
Space between arytenoids,.....	6
Arytenoids and vocal cords of both sides,.....	2
Arytenoids and space between them and epiglottis,.....	1
Vocal cords of both sides,.....	2
Epiglottis,.....	6
Entire larynx,.....	13
Subglottic walls of larynx,.....	1
Subglottic walls of larynx and trachea,.....	1
Not recorded,.....	3

FORM OF LESION.

In the fifty-eight cases of tuberculous laryngitis the form of lesion was:

Congestion,	2
Erosion,	2
Infiltration,	24
Infiltration and edema,	2
Infiltration and erosion,	2
Infiltration and ulceration,	14
Infiltration, ulceration, and edema,	4
Ulceration,	4
Tuberculoma,	1
Not recorded,	3

NON-TUBERCULOUS LESIONS IN TUBERCULOUS CASES.

In the one hundred and fifty-two cases of non-tuberculosis of the upper respiratory tract the examination revealed:

Aphonia, functional,	1
Cerumen impacted,	2
Examination impossible,	1
Examination negative,	2
Gingivitis,	1
Globus hystericus,	1
Laryngitis, acute catarrhal,	6
" chronic catarrhal,	7
" chronic hyperplastic,	2
" subacute catarrhal,	14
Laryngo-trachitis, chronic catarrhal,	2
" subacute catarrhal,	2
Otitis media, acute catarrhal,	1
" " acute purulent,	2
" " chronic catarrhal,	1
" " chronic purulent,	9
" " subacute purulent,	2
Pharyngitis, acute catarrhal,	1
" chronic catarrhal,	3
" follicular,	1
" lateral,	1
" sclerotic,	1
" subacute catarrhal,	2
Pharynx, tertiary syphilis of,	1
" and fauces, tertiary syphilis of,	1
Polypi, nasal mucous,	1
Pyorrhea alveolaris,	1
Rhinitis, acute,	1
" atrophic,	4
" chronic,	2
" hyperplastic,	1
" subacute,	1
" vasomotor,	2

Rhino-pharyngitis, acute catarrhal,	1
" atrophic,	1
" chronic catarrhal,	10
" sclerotic,	9
" subacute catarrhal,	8
Septum, nasal, deflection of,	12
" " excoriation of,	1
" " perforation of,	1
" " ridge of,	2
" " spur of,	1
Salpingitis, Eustachian, acute catarrhal,	1
" " chronic,	2
" " subacute,	1
Sinusitis, chronic frontal,	1
" subacute antral,	1
" subacute sphenoidal,	1
Tonsil, faucial, hyperplasia of,	1
" " and pharyngeal, hyperplasia of,	4
" " and lingual, hyperplasia of,	3
" pharyngeal, hyperplasia of,	3
Tonsillitis, acute lacunar,	1
" chronic lacunar,	2
" subacute,	1
Trachitis, acute ulcerative,	1
" chronic catarrhal,	1
" subacute catarrhal,	1
Uvula, myxoma of,	1

The three following cases are of a little more than ordinary interest on account of being treated surgically, and hence are given in detail. By surgical treatment is meant any method or procedure aiming at destruction of lesions by galvanocautery, curette, snare, or cutting instruments. The percentage of cases amenable to this form of treatment is unfortunately small, since only in selected (not far advanced) cases are we justified in resorting to this measure.

Case No. 2056. Male. Age, twenty-four. Date of examination 12 : 28 : '04. Chief complaint, hoarseness of several weeks' duration, resulting in complete aphonia just prior to examination. Never complained of dysphagia or odynophagia. Examination of nose, nasopharynx, and oral cavity negative, with exception of an angular deflection of nasal septal cartilage, pointing to the left side. Laryngeal examination revealed epiglottis normal, aryepiglottidean folds thickened in their posterior portions, more especially the left, interarytenoid fold full, with some papillomatous-like vegetations present. Right and left ventricular bands congested, anterior commissure normal. Posterior commissure infiltrated. Both vocal cords

infiltrated and ulcerated, the ulceration appearing about the approximating edges. The trachea presented on its posterior wall three or four ulcers with grayish base and elevated edges, the area of these ulcers in aggregate being about the size of a half dollar.

Treatment: The tracheal ulcers were stimulated by direct application of silver and patient put on inhalations of formalin. Cauterization of infiltrated posterior commissure was done 1 : 25 : '05, 3 : 25 : '05, and 4 : 5 : '05.

Examination 6 : 28 : '05 showed tracheal ulceration about one-tenth of the original size, infiltration about subsided. Examination from time to time after this date showed improvement. On 12 : 16 : '05 there was some return of the infiltration, and deep cauterization was performed. The case was not seen again until 5 : 11 : '06, at which time there was again a recurrence, and the interarytenoid fold was again cauterized.

Case No. 3092. Female. Age, thirty-one. Date of examination 2 : 5 : '06. Patient complained of progressive dyspnea, aphonia, and considerable tickling in throat, which was said to be always very dry and parched. There was also a history of long-standing crust formation in nose and bilateral ear impairment. Examination revealed cacosmia rather marked, no local tenderness over larynx, atrophied turbinates with the associated crusting in the nasal fossæ, and the typical atrophic picture with crust formation in the pharynx, especially noticeable in the oral portion. Examination of ears showed on right a chronic catarrhal otitis media, and on left a chronic purulent otitis media. Examination of larynx showed epiglottis congested, arytenoid cartilages somewhat infiltrated, the posterior commissure also infiltrated and almost entirely obliterated by a tuberculoma which seemed more adherent to the left side. During the first two weeks of observation the laryngeal growth increased somewhat in size and the infiltration became more marked.

Treatment: Several ineffectual attempts at removal of the tuberculoma were made and the infiltrations were cauterized in order to give more breathing space. On 3 : 27 : '06, or about seven weeks after examination, the pharyngeal reflexes were under sufficient control to permit removal of the tuberculoma *in toto* by the cold snare, and the base was afterward seared with the galvanocautery. On 4 : 2 : '06 the voice and breathing were both much improved, though examination still showed considerable fullness of the posterior commissure. On this date a V-shaped mass was excised from the commissure and the wound was subsequently cauterized. Result, marked improvement.

Case No. 3649. Male. Age, sixty-four. Date of examination 10 : 5 : '05. Patient complained of a feeling of obstruction in throat which

he located in laryngeal region. He also gave a history of hoarseness of two years' duration. At no time did he complain of dysphagia or odynophagia or pain of any kind referable to the throat. Examination was practically negative, with exception of the laryngeal findings, which were as follows: Epiglottis congested, aryepiglottidean folds congested and thickened; interarytenoid fold and posterior commissure congested with the surface showing a superficial ulceration; arytenoid cartilages congested and infiltrated; vocal cords congested, especially the right, which also presents an ulcerated nodule, at about the junction of anterior and middle third.

During the first three months of treatment improvement was not particularly noticeable. On 1 : 13 : '06 injections of Maragliano serum were begun and given on alternate days until the end of the following March. During this period of about nine weeks, under the local and the serum treatment the improvement was very conspicuous. Active evidence of the disease in larynx stopped about two months after discontinuing serum-therapy, though there still remained indurated masses indicating the seats of ulceration. In the posterior commissure this induration was sufficient to warrant surgical intervention, and the induration was removed in two sittings, the first of which was in July, 1906, and the second a few weeks subsequently, the galvanocautery knife being employed. Result, marked improvement.

HENRY J. OFF.

THE IMPORTANCE OF THE UPPER RESPIRATORY TRACT IN THE ETIOLOGY OF CRYPTOGENETIC INFECTIONS, ESPECIALLY IN RELATION TO PLEURITIS.

The work which is outlined in this paper was undertaken with the purpose of determining whether there could be any direct relation between lesions in the upper respiratory tract and pleural infections. During the last few years several articles have appeared, pro and con, as to the possibility of a direct lymphatic connection between the throat and the bronchial glands as well as the pleural apices, but a great deal more thought and work have been directed toward the importance of the throat as being the starting-point for general hematogenous infection. These two questions are, however, closely associated, for if the invading germ has penetrated along the lymph-paths as far as the pleura, it would seem that occasionally an entrance into the blood might very easily be accomplished. And, on the other hand, if the pleura should be, at the time of the infection, the place of least resistance, bacteria which have entered the blood may lodge and grow at this spot. Yet, while there is more or less connection between the hematogenous and lymphatic routes, there may be a radical difference in their reception which is of great importance. Boeri has shown that while toxins pass through blood-vessel walls very easily, it is almost impossible for bacteria to do so, although they readily penetrate along the lymph-channels. If the infection is hematogenous in the start, it must be simply a septicemia due to the absorbing of toxins from an infecting focus, in which case only

the toxins leave the original local process and not bacteria. If the lymph-channels are the route of invasion, then it is very possible for micro-organisms themselves to be carried from their original seat, and after successfully overcoming the various lymph-glands in their way, finally give rise to a true bacteremia. Therefore, in regard to the influence of lesions of the upper respiratory tract on pleural conditions we must recognize that there are two routes of attack from the throat.

For an infection to start there must be some portion of the throat which may act as a gate of entrance, some place of insufficient resistance which may either become an infecting nidus or act as an entrance. As lymphatic tissue is the tissue par excellence for the propagation of infections, it is natural that one should suspect the tonsils of showing lessened resistance.

By the tonsils I do not mean the faucial tonsils alone, but also the pharyngeal and lingual tonsils, the lymphoid tissue of the lateral folds of the pharynx, and the lymph-follicles of the posterior pharyngeal wall. However, as the faucial tonsils would generally represent by far the greater amount of lymphoid tissue in the throat, these structures are much more open to investigation, and hence the greater part of the work that will be outlined in this paper pertains especially to them.

The opposition to the entrance of bacteria into the body from any surface depends upon the vital resistance of the tissues, and also upon the mechanical barrier presented by the lining membrane. The epithelium lining the upper respiratory tract is either a stratified squamous variety, as exemplified in the mouth, or a stratified ciliated columnar type, as found in the nose. The surface of the faucial tonsils is covered by stratified squamous cells. The structure of a tonsil resembles somewhat that of a lymph-gland, differing, however, in that it possesses no afferent lymph-vessels and no periglandular sinuses, and does possess those peculiar structures, the crypts or lacunæ.

The crypt of the tonsil is its peculiar and most characteristic

structure. It consists of an invagination of the epithelium from the surface of the tonsil, which has undergone a very interesting anatomical change. In the first place, the subepithelial connective tissue which exists in a marked degree beneath the surface epithelium, disappears as soon as the epithelium starts to form the crypts. This permits the epithelium to come in direct contact with the lymphatic structure of the tonsil, and very frequently it is impossible to distinguish a dividing-line between the epithelium of the crypt and the interfollicular tissue. The epithelium of the crypt, unlike its progenitor which covers the surface of the tonsil, does not form a compact, unbroken barrier of protection. For the greater part of its extent it presents an intact line, only one or two or possibly three cells in thickness, and there are occasional spaces between these cells. Toward the parenchyma the epithelial cells show a peculiar condition. They are separated from each other by interposed cells varying in type from slightly changed epithelial cells to well-formed lymphocytes. The epithelial cells may also extend from the crypt into the tonsillar substance, suggesting the ramifications of a malignant epithelioma. The smaller terminal invaginations of the cryptal epithelium are usually solid sprouts, sometimes, however, with central keratosed cores, the exfoliation of which causes an extension of the lumen of the crypt.

In the crypt, then, we have a loose disintegrated epithelium which, as far as any mechanical barrier is concerned, presents an open door to microbic infection, and it has been shown that minute inert foreign bodies readily pass between the cells. Further, in the faucial tonsils especially the gross arrangement of the crypts is such that frequently they form pockets and recesses capable of retaining large numbers of bacteria which find plenty of nourishment in the desquamating epithelium.

Now, it would seem that unless the vital resistance is considerably greater in the tonsil than in the surrounding structures, the tonsillar tissue ought to be the vulnerable spot in the throat. Subject as the tonsil parenchyma is to microbic influences by

absorption of toxins, and also, it may be, of bacteria through the cryptal walls, it was thought possible that there might be developed in the tonsil certain antibodies which would make this structure especially resistant to germ invasion. If it could be demonstrated that the tonsils held in store great quantities of antitoxin and bacteriolytic substances, then one might possibly be justified in believing that the tissue of which they are composed is especially resistant to bacterial invasion.

The following experiments were kindly carried out for me by Dr. M. P. Ravenel. The chief difficulty which seemed to stand in the way of this research was to obtain the soluble portions of the tonsil in a sterile condition, without destroying the immune bodies if such existed, but this was overcome by the use of the Pasteur filter.

About 13 g. of hypertrophied faucial and pharyngeal tonsils, removed from several children, were ground to a pulp in a "broyeur" with about 50 c.c. of sterile water. The mixture was then passed through a Pasteur filter. A part of the filtrate, as a control test, was incubated for one week, and at the end of that time was still clear and sterile.

The rest of the filtrate was treated as follows:

One cubic centimeter of filtrate was added to 5 c.c. of bouillon and inoculated with typhoid bacilli.

Two cubic centimeters of filtrate were added to 5 c.c. of bouillon and inoculated with typhoid bacilli.

Three cubic centimeters of filtrate were added to 5 c.c. of bouillon and inoculated with typhoid bacilli.

After incubation all of these tests showed the same degree of turbidity in the same length of time.

In these experiments it was supposed there was sufficient complement present in the tonsils to cause lysis of the typhoid bacilli, provided the specific immune body was present in sufficient quantity to unite it with them. This was, on the face of it, an unwarranted supposition, and again the known frailty of

complements in general was a very poor guarantee for its safe passage through all the manipulation and time requisite to sterilize the tonsillar substance.

Therefore a second series of tests was made. The sterile tonsillar filtrate was obtained as before, the amount of tonsillar substance being the faucial and pharyngeal tonsils from three children in whom hypertrophy of these structures had made operation necessary.

It might very well have happened that the children from whom the tonsils were removed had never been brought in contact with the typhoid bacillus, and consequently had no specific immunity to this disease, so in this second series a more common microorganism was employed.

Ten tubes of bouillon were inoculated with the staphylococcus aureus. To eight of these tubes the tonsillar filtrate was added, and to four of these eight fresh serum was added. All ten tubes were then incubated for twenty-four hours, and all showed the same degree of turbidity, that is, equal bacterial growth.

This failure to find immune bodies in the tonsil may be due to a lack of sensitiveness in the technic; or to the simple fact that the reasoning concerning this subject has been false; or it may be that soluble substances are so easily removed by both the blood-vessels and lymph-channels that immune bodies as well as toxins and antitoxins cannot accumulate in the tonsil. To my reasoning this last explanation would seem the most likely. The blood-supply of the tonsil is fairly rich and the efferent lymph-stream is a decided entity, so that a soluble substance could probably not remain long in the tonsillar structure. The rapid and marked systemic intoxication seen in cases of simple tonsillitis shows that some toxins, at least, are readily absorbed from the tonsil into the general circulation, and it is more than probable that the first general symptoms are due to toxic absorption through the blood-vessels. The slowness of the lymphatic method of infection is shown by the fact that enlargement and tenderness of the tonsillar

lymph-gland at the angle of the jaw is not always present in simple tonsillitis, and is almost never present at the very beginning of the attack.

It seems, therefore, scarcely possible for a great quantity of immune bodies to accumulate in the tonsil, and it is much more probable that the larger amount of such material enters the general circulation. This failure to find any considerable amount of immune bodies in the tonsillar tissue, as has been indicated, leaves us still uncertain as to the degree of vital resistance of the tonsillar structure.

Of later years there has been a great deal of work done in regard to the susceptibility of the tonsil to tuberculous infection, but as I have already gone over the literature of this subject rather thoroughly as late as 1904, I will simply mention some of the deductions and give the bibliography which bears on the subject of this paper.

In pulmonary tuberculosis the expectoration is coughed up so that it comes in nearly equal contact with all parts of the respiratory tract except the nose and nasopharynx, and thus a fairly even dose of tubercle bacilli is spread over the mouth, pharynx, and larynx. In one hundred and thirty-six cases of pulmonary tuberculosis reported by seven different observers, the tonsils were involved ninety-four times. That is, in 69% of pulmonary tuberculosis the tonsils were diseased. In 1904 I reported nine cases of pulmonary tuberculosis in which the tonsils were examined at autopsy, and in every one I found histologic changes sufficient to justify a diagnosis of tuberculosis. This evidence is pretty strong, showing that, at least as far as tubercle bacilli are concerned, the tonsil is much more easily invaded than any other part of the upper respiratory tract. This argues against the theory that the tonsillar tissue is especially resistant to bacteria. The question, however, is so important that it was thought worth while to examine a sufficient number of cases to positively determine the tonsillar vulnerability to the tubercle bacillus at least; so during the past

year I made a careful post-mortem study of the tonsils of thirty-seven cases, who clinically were supposed to have died from pulmonary tuberculosis.

These cases are reported in some detail as to the histological condition of the tonsils, with a brief synopsis of the general tuberculous involvement. The numbers attached are the regular numbers at the Phipps Institute.

TUBERCULOSIS OF THE LUNGS WITH TUBERCULOSIS OF THE TONSILS.

Case No. 903. Left pleura showed adhesions everywhere. Left lung, upper lobe showed a large cavity and infiltration, lower lobe was partially consolidated. Right pleura showed dense adhesions everywhere. Right lung, upper lobe showed numerous cavities with excess of fibrous tissue, and the middle and lower lobes a few isolated tubercles. The liver, spleen, and kidneys showed tuberculous lesions.

Tonsils were very small and portions of the cryptal epithelium infiltrated. The germinating follicles were few and small. There was marked fibrosis. A few discrete but distinct tubercles were found, showing caseation and typical giant cells.

Case No. 2632. Left pleura was thickened, with adhesions at apex. Left lung, upper lobe showed one large cavity with several small ones, lower lobe was compressed and infiltrated. Right pleura was thickened, with adhesions everywhere. Right lung, upper lobe was pneumonic, with numerous tubercles, middle and lower lobes were partially infiltrated. The liver, intestines, kidneys, and lymph-nodes showed tuberculous involvement.

Tonsils were small with only slight infiltration of the cryptal epithelium and very few germinating follicles. There were discrete tubercles with giant cells.

Case No. 2727. Left pleura showed adhesions. Left lung, upper and lower lobes showed cavity formations and coalesced tubercles. Right pleura showed adhesions at apex. Right lung, upper lobe showed one large cavity, middle and lower lobes were infiltrated, with coalesced and miliary tubercles. Spleen was tuberculous.

Tonsils were moderate in size, congested, and the cryptal epithelium was infiltrated. There was an excess of lymphoid tissue which was infiltrated with

polymorphonuclear leucocytes. There were diffuse tubercles with caseation and giant cells.

Case No. 2980. Left pleura showed adhesions everywhere. Left lung, upper lobe showed cavities and consolidation, lower lobe was congested and infiltrated with both coalesced and miliary tubercles. Right pleura showed adhesions everywhere. Right lung, upper lobe showed a cavity and was infiltrated, middle lobe was edematous, lower lobe showed a few coalesced tubercles. Liver, kidney, and spleen were tuberculous.

Tonsils were large and showed considerable lymphoid tissue. There were numerous diffuse and discrete tubercles showing necrosis and giant cells.

Case No. 3052. Left pleura was thickened, with adhesions everywhere. Left lung, upper lobe showed a cavity and pneumonic consolidation, lower lobe showed numerous tubercles. Right pleura showed a few adhesions at apex. Right lung, upper, middle, and lower lobes contained a few tubercles. Larynx was tuberculous.

Tonsils were moderate in size, with numerous follicles. The cryptal epithelium was infiltrated and there was a slight fibrosis. There were a few tubercles with necrosis and giant cells.

Case No. 3182. Left pleura showed adhesions. Left lung, upper and lower lobes showed numerous cavities and were consolidated. Right pleura showed a few adhesions. Right lung, upper, middle, and lower lobes all showed cavity formation, with more or less pneumonic consolidation. Intestines and kidneys were tuberculous.

Tonsils were very small. The cryptal epithelium was intact and infiltrated. There were no follicles and very little lymphoid tissue. There was marked diffuse tuberculosis with caseation and numerous giant cells.

Case No. 3253. Left pleura showed adhesions over the upper lobe. Left lung, upper lobe showed a small cavity, areas of consolidation, and some excess of fibrous tissue. Right pleura showed adhesions over the upper and lower lobes. Right lung, upper, middle, and lower lobes showed numerous cavities, with consolidation and caseation.

Tonsils were small, had no follicles, and very little lymphoid tissue. There was considerable fibrosis. The epithelium of the crypts was not infiltrated, but the crypts were filled with masses of bacteria, and portions of the epithelium were ulcerated. There were several cartilaginous nodules in the connective tissue. After cutting numerous sections a few tubercles were found showing typical giant cells and caseation.

Case No. 3393. Left pleura showed adhesions throughout. Left lung, upper and middle lobes showed cavity formation and caseous consolidation. Right pleura showed adhesions at apex. Right lung, upper and middle lobes showed small cavities and irregular consolidation. Larynx, intestines, and kidneys were tuberculous.

Tonsils were small. The cryptal epithelium was for the most part not infiltrated. There was very little lymphoid tissue and a very few small follicles. There was marked fibrosis. Numerous discrete tubercles were found with giant cells but no necrosis.

Case No. 3405. Left pleura was normal. Left lung, upper lobe showed small tubercles, lower lobe showed caseous pneumonia. Right pleura showed adhesions at apex. Right lung, upper lobe showed one large cavity and infiltration, middle and lower lobes were partially consolidated. Liver and spleen were tuberculous.

Tonsils were very small. The epithelium of the crypts was considerably infiltrated and follicles were moderately numerous. There was slight fibrosis. Numerous small discrete tubercles were seen and a great many giant cells.

Case No. 3441. Left pleura showed adhesions at apex. Left lung, upper lobe showed several cavities and was infiltrated. Right pleura showed adhesions around the upper lobe. Right lung, upper and lower lobes showed cavity formation, middle lobe showed a few isolated tubercles. Kidneys were tuberculous.

Tonsils were very small. The epithelium for the most part was intact, but was ulcerated in one or two places. There was very little lymphatic tissue and the follicles were few and small and there was marked fibrosis. Several tubercles were found, some with caseation and giant cells.

Case No. 3526. Left pleura showed adhesions everywhere. Left lung, upper lobe showed a cavity and was partially infiltrated. Right pleura showed adhesions everywhere. Right lung, upper, middle, and lower lobes showed cavity formation. Trachea, intestines, and kidneys were tuberculous.

Tonsils were small. There were a few follicles and the epithelium of the crypts was mostly intact. There was considerable fibrosis. There were several discrete tubercles with giant cells.

Case No. 3548. Left pleura showed adhesions about the upper lobe. Left lung, upper and lower lobes showed cavity formation with some caseous pneumonia. Right pleura showed adhesions throughout. Right lung, middle

and upper lobes showed cavity formation with some consolidation, lower lobe contained a few coalesced tubercles. Larynx and intestines were tuberculous.

Tonsils were small. The epithelium was generally intact, but necrotic in a few places. The follicles were few and small. There were numerous tubercles with giant cells, but very little caseation.

Case No. 3559. Left pleura showed adhesions over upper lobe. Left lung, upper lobe showed cavity formation, lower lobe was partly consolidated. Right pleura showed extensive adhesions. Right lung, upper, middle, and lower lobes showed rather extensive cavity formation. Larynx, trachea, intestines, and kidneys were tuberculous.

Tonsils were small, containing few follicles, and the cryptal epithelium was intact. There was considerable fibrosis. There were numerous diffuse tubercles with giant cells.

Case No. 3633. Left pleura was normal. Left lung, upper and middle lobes showed numerous miliary tubercles. Right pleura showed adhesions at apex and on diaphragm. Right lung, upper lobe showed several cavities, middle and lower lobes showed miliary tuberculous infiltration. Larnyx, intestines, and spleen were tuberculous.

Tonsils were small and contained only a few small follicles. The cryptal epithelium was slightly infiltrated, and that only in a few places. There was considerable fibrosis and there were some cartilaginous nodules in the connective tissue. A few scattered tubercles with giant cells were found.

Case No. 3643. Left pleura showed adhesions at apex. Left lung, upper lobe showed cavity formation, lower lobe contained a very few tubercles. Right pleura showed adhesions at apex. Right lung, upper and lower lobes contained cavities, middle lobe showed a few isolated tubercles. Liver and intestines were tuberculous.

Tonsils were somewhat enlarged and there was considerable amount of lymphatic tissue, but very few follicles. The epithelium was infiltrated. There was some congestion with very slight fibrosis. Several rather diffuse tubercles were found, showing caseation and nuclear fragmentation, but there were no typical giant cells.

Case No. 3677. Left pleura showed adhesions at apex. Left lung, upper and lower lobes contained cavities. Right pleura showed adhesions throughout. Right lung, upper, middle, and lower lobes all showed cavity formation.

Tonsils were moderate in size. The cryptal epithelium was intact and

there were very few and small follicles. There was slight fibrosis. There was a diffuse tuberculosis, with a few giant cells, considerable nuclear fragmentation, but little necrosis.

Case No. 3697. Left pleura showed adhesions throughout. Left lung, upper lobe contained a large cavity, lower lobe showed numerous coalesced tubercles. Right pleura showed extensive adhesions. Right lung, upper lobe contained a large cavity, middle lobe contained numerous coalesced tubercles, lower lobe showed very little consolidation. Larynx, intestines, liver and kidneys were tuberculous.

Tonsils were small. The follicles were very few and small. There was considerable fibrosis, though the epithelium was for the greater part infiltrated. Numerous tubercles with giant cells were found and some caseation.

Case No. 3749. Clinical diagnosis was pulmonary tuberculosis with pneumothorax. Unfortunately there were no post-mortem notes as to the condition of the lungs.

Tonsils were moderate in size, with fair amount of lymphoid tissue, but no follicles. The epithelium was for the greater part infiltrated and there was a slight fibrosis. Numerous discrete tubercles were found, with numerous and very large giant cells.

Case No. 3831. Left pleura showed adhesions at apex. Left lung, upper and lower lobes showed cavity formation with caseation. Right pleura was normal. Right lung, upper, middle, and lower lobes showed a few tubercles.

Tonsils were small. There was a great deal of fibrous tissue. The epithelium was infiltrated only in places. There was very little lymphoid tissue and practically no follicles. There were fairly numerous discrete tubercles, with giant cells, but no necrosis. Some of the tubercles were evidently being replaced by fibrous tissue.

Case No. 3880. Left pleura showed extensive adhesions. Left lung, upper lobe contained a cavity and some infiltration, lower lobe was infiltrated. Right pleura showed adhesions throughout. Right lung, upper lobe contained a cavity and considerable fibrous tissue, middle and lower lobes contained tubercles, some of which were healed.

Tonsils were medium in size. The follicles were fairly numerous and about ordinary size. The epithelium was infiltrated. There was very little fibrosis. A few tubercles, with giant cells and necrosis, were found.

Case No. 3887. Left pleura showed few adhesions. Left lung, upper and

lower lobes contained a few scattered tubercles. Right pleura showed adhesions at apex. Right lung, upper lobe contained a large cavity with some infiltration, middle and lower lobes presented a few isolated tubercles.

Tonsils were small. The epithelium was infiltrated in places; there was marked fibrosis, but fairly normal and fairly large follicles; also some congestion. A very few but distinct tubercles were found with giant cells and caseation. Some of the sections showed no tuberculosis.

Case No. 3907. Left pleura showed adhesions at apex. Left lung, upper lobe contained several cavities, lower lobe, was partially infiltrated. Right pleura showed adhesions at apex. Right lung, upper, middle, and lower lobes all contained cavities.

Tonsils were small, the follicles were few and small. The epithelium was slightly infiltrated and there was considerable fibrosis with very little lymphoid tissue. A few tubercles with giant cells were found.

Case No. 3918. Left pleura showed extensive adhesions. Left lung, upper and lower lobes showed considerable infiltration. Right pleura was not reported on. Right lung, upper, middle, and lower lobes were all more or less infiltrated.

Tonsils were moderately enlarged. The epithelium was infiltrated in only a few places. The follicles were fairly numerous and quite large. There was slight fibrosis and considerable congestion. A very few tubercles, with giant cells, were found.

Case No. 3941. Left pleura showed adhesions at apex. Left lung, upper lobe contained numerous cavities, lower lobe was partially consolidated. Right pleura showed adhesions everywhere. Right lung, upper, middle, and lower lobes all showed cavity formation with infiltration.

Tonsils were rather large, but with very few follicles. The epithelium of the crypts was somewhat infiltrated and there was slight fibrosis. There was marked tuberculosis, with numerous tubercles showing giant cells and caseation.

Case No. 3953. Left pleura showed adhesions everywhere. Left lung, upper and lower lobes both showed cavity formation. Right pleura showed adhesions everywhere. Right lung, upper, middle, and lower lobes all showed cavity formation. Larynx and intestines were tuberculous.

Tonsils were slightly enlarged. The epithelium of the crypts was fairly intact and there was marked fibrosis and few follicles. There was very marked tuberculous infiltration, consisting of both discrete and confluent tubercles.

There was some caseation, but the tubercles seemed to be undergoing fibrosis rather than softening. There were numerous giant cells.

Case No. 4010. Left pleura showed adhesions everywhere. Left lung, upper lobe showed numerous cavities with some excess of fibrous tissue. Right pleura showed adhesions at apex. Right lung, upper lobe showed cavities with excess of fibrous tissue, middle lobe showed a few tubercles, lower lobe showed one cavity with a few tubercles. Larynx, intestines, and kidneys were tuberculous.

Tonsils were rather large, with few follicles. The cryptal epithelium was considerably infiltrated and there was marked fibrosis. There were large numbers of discrete tubercles, with numerous giant cells, but very little necrosis.

Case No. 4021. Left pleura showed adhesions in the upper part. Left lung, upper lobe showed cavities, lower lobe showed numerous coalesced tubercles. Right pleura showed adhesions at the apex. Right lung, upper, middle, and lower lobes showed cavities and caseous tubercles. Kidneys were tuberculous.

Tonsils were very small, with a very small amount of lymphoid tissue. The epithelium was intact, and there was marked fibrosis. There were only a few doubtful tubercles.

Case No. 4040. Left pleura showed adhesions at apex. Left lung, upper and lower lobes were almost completely consolidated. Right pleura showed extensive adhesions. Right lung, upper and lower lobes showed cavity formation, with infiltration, middle lobe was infiltrated. Larynx, liver, intestines, and kidneys were tuberculous.

Tonsils were rather large, but there was only a small amount of lymphoid tissue. The cryptal epithelium, though generally intact, was ulcerated in a few places. There was very marked fibrosis and the follicles were few and small. There were numerous tubercles, both discrete and confluent, with giant cells and considerable caseation.

Case No. 4141. Left pleura showed old adhesions. Left lung, upper lobe showed a healed lesion, lower lobe showed bronchopneumonia. Right pleura showed old adhesions. Right lung, upper lobe showed a large cavity, with consolidation, which was not typical, however, of tuberculosis; middle and lower lobes showed bronchopneumonia. Kidneys and spleen showed doubtful tuberculosis.

Tonsils were small. Cryptal epithelium was slightly infiltrated. Fol-

licles were small, but fairly numerous, and there was no fibrosis. There were a few very doubtful tubercles found.

Case No. 4155. Left pleura showed adhesions everywhere. Left lung, upper and lower lobes showed cavity formation and caseous infiltration. Right pleura showed adhesions at apex. Right lung, upper and middle lobes showed cavity formation with fairly numerous tubercles. Larynx, liver, and intestines were tuberculous.

Tonsils were very small and had very few and small follicles. There was marked fibrosis and the epithelium was generally intact. There were a few tubercles with giant cells, but no necrosis.

Case No. 4281. Left pleura showed some adhesions along the axillary line. Left lung, upper lobe showed a cavity and was infiltrated, lower lobe was partially consolidated. Right pleura showed adhesions in axillary line. Right lung, upper, middle, and lower lobes all showed tuberculous infiltration. Larynx, trachea, liver, intestines, kidneys, and spleen were tuberculous.

Tonsils were small and the follicles were very few and small. The epithelium was active in some places and there was considerable fibrosis. There were a few distinct discrete tubercles with giant cells, but no fibrosis.

TUBERCULOSIS OF THE LUNGS WITHOUT TUBERCULOSIS OF THE TONSILS.

Case No. 3896. Left pleura showed a few adhesions. Left lung was practically normal except for a small healed lesion and a few miliary tubercles. Right pleura showed adhesions at apex. Right lung, upper lobe showed cavities and some consolidation, middle and lower lobes were partly consolidated.

Tonsils were somewhat enlarged. There were numerous follicles. The epithelium of the crypts was infiltrated. One of the crypts contained a calculus. There was slight fibrosis and some cartilage in the connective tissue; also some congestion. No tuberculosis was found.

Case No. 4023. Left pleura showed adhesions everywhere. Left lung, upper lobe showed a cavity, with excess of fibrous tissue, lower lobe showed a few isolated and coalesced tubercles. Right pleura showed adhesions everywhere. Right lung, upper, middle, and lower lobes all showed cavity formation. Liver and large intestine showed tuberculosis.

Tonsils were extremely small and showed almost no lymphoid tissue or follicles. The epithelium was almost everywhere intact. No tuberculous changes were found.

Case No. 4140. Left pleura showed extensive adhesions. Left lung, upper and lower lobes were infiltrated. Right pleura showed extensive adhesions. Right lung, upper, middle, and lower lobes showed tuberculous infiltration. Intestines were tuberculous and showed a perforating ulcer which by causing peritonitis was the evident cause of death. Kidney and spleen were also tuberculous.

Tonsils were moderate in size. Crypts were generally intact and there were only a few small follicles, but marked fibrosis. No tuberculosis was discovered.

NON-TUBERCULOUS CASES.

Case No. 3537. Left pleura showed adhesions at apex, but the case was not proved at autopsy to be tuberculous. There were scattered areas of pneumonia in each lung, and numerous small foci, containing a thick, creamy, pus-like substance, and a few other areas which looked suspiciously like tubercles.

Tonsils were large, containing numerous and fairly large follicles. The epithelium was greatly infiltrated, and there was a slight fibrosis. No tuberculous changes were discovered.

Case No. 3699. There was a pleuritic effusion on the left side, with hypostatic pneumonia in the lower lobe. The right lung was nearly normal. Patient died of valvular heart disease.

Tonsils were large, with infiltrated epithelium, a slight fibrosis, marked congestion, and small but fairly numerous follicles. No tuberculous changes could be found.

Case No. 4116. Left pleura was normal. Left lung, upper and lower lobes showed no tuberculosis. Right pleura showed adhesions throughout and there was a purulent pleurisy. Right lung was collapsed, but showed no tuberculosis. The spleen showed areas of possibly healed tubercles.

Tonsils were large. There was considerable lymphoid tissue and numerous follicles. The epithelium was greatly infiltrated and there was a slight fibrosis. No tuberculosis could be found.

In the thirty-seven cases just outlined, three were found on post-mortem examination to be non-tuberculous. The tonsils of each of these non-tuberculous cases failed to show histological changes at all characteristic of tuberculosis. In the rest, that is, in thirty-four cases, the tonsils of twenty-nine showed absolutely

typical lesions of tuberculosis, and two showed lesions which were probably tuberculous, though no typical giant cells were found. In the remaining three of the thirty-four tuberculous cases no change at all characteristic of tuberculosis could be found in the tonsils. In these three cases six to ten slides were examined; all, however, were cut from the same paraffin block, so that by far the greater part of the tonsils was not examined, and it is possible that some portion of the tonsils which was not examined might have been tuberculous.

So far it seems practically proved that for the tuberculosis germ, at least, the tonsil is many more times susceptible than other portions of the throat. Further, I believe that it is a justifiable deduction to say that if one organism passes readily into the tonsillar tissue it is probable that other organisms may do the same thing, provided their pathogenic power is sufficiently great to overcome the tissue resistance. The findings in acute tonsillitis would tend to bear this out. In this disease the number of micro-organisms which invade the parenchyma of the tonsil is so large that they can easily be found with the microscope, and the varieties of bacteria which are capable of producing tonsillitis are very great, including practically all of the pyogenic micro-organisms.

The crypts of normal tonsils are frequently filled with a large number of micro-organisms, but they are seldom found in the parenchyma. The only method, however, of direct investigation —that of microscopic examination—is most unsatisfactory on account of its limitations, in that if only a few micro-organisms are present they may readily escape detection. Inoculation or culture tests are of absolutely no value, as the cryptal ramifications are so numerous and so close together that it would be impossible to obtain any considerable portion of the tonsil without a crypt, and hence contamination.

E. Lexer claims by experimentation to have succeeded in getting streptococci, which had been cultivated so as to have a special virulence toward the rabbit, to enter the crypts, pass through the

tonsillar tissue, and to enter the blood within three and a half hours after inoculation. The organisms were found in the tonsillar substance an hour after inoculation.

Piera also demonstrated experimentally that micro-organisms could be absorbed through the epithelium of the crypts, but if they were not capable of resisting the vital action of the tissues they were destroyed practically as soon as they had entered the tonsillar parenchyma.

From the clinical standpoint there is strong evidence that various organisms not only penetrate into the tonsillar substance, but also pass from the tonsil to the general system. The variety of diseases which has been reported as resulting from tonsillar infection includes acute inflammation of nearly all organs. The literature on this subject is rather excessive, but it is well worth while to briefly review some of these articles, as they not only point out the possibility of systemic infection through the tonsils, but are also of value in that they give a more comprehensive view of the subject, representing a greater extent of thought.

I will take up the various diseases separately, giving under each a brief abstract of the individual papers.

RHEUMATISM.

ACUTE INFLAMMATORY RHEUMATISM is now considered by the large majority of clinicians to be an infectious disease, and the possibility that in a certain number of cases the infection arises within the tonsil is being more and more recognized.

Suchannek believes that a considerable number of these cases are caused by tonsillitis.

Meitus says that articular rheumatism is caused by micro-organisms which enter the body through the tonsils.

Packard, after a careful and critical review of the literature on this subject, believes it is possible that there is an attenuation of micro-organisms invading the body through the adenoid tissue of the throat, so that they produce the phenomenon known as articular rheumatism rather than the ordinary septicemia or pyemia.

St. Clair Thompson says that the connection of angina and rheumatism, though undoubted in a certain number of cases, is not yet clearly established. The tonsils may be the port of entry of the rheumatic virus, and this even though the naked-eye appearance of the throat gives no indication of its being affected.

Jakobi admits the close connection between tonsillitis and rheumatism, and advises the removal of large tonsils.

Stengel reports one case, and Turner two cases, of acute rheumatism, within a few days after an attack of sore throat.

In two hundred and seventy cases of acute rheumatism reported by McCrae, only 3.7% had tonsillitis previous to the attack.

Kuhn reports three cases of acute articular rheumatism, following tonsillitis.

Williams and Miller both concede to the tonsils a very important part in the production of acute rheumatism.

A critical editorial in the "Journal of the American Medical Association" says that the tonsils seem to be in a large number of cases the portal of entry of the infection in articular rheumatism.

Gurich reports three cases of rheumatism directly traceable to tonsillar infection, and claims that many cases of acute articular rheumatism are caused by "fossulare angina," and that the rheumatism gets well when the tonsillar disease has been properly treated.

Ingalls, after a careful study of one hundred of his own cases of tonsillitis, reverses his former view, and now believes that tonsillitis plays a very important part in the etiology of rheumatism.

Phillips, in two hundred and ten cases of acute articular rheumatism, found that tonsillitis developed during or before the illness in 18.01%.

Epstein reports one case of rheumatism complicated with pleurisy, following an attack of tonsillitis.

Hammerschmidt reports seventeen cases of rheumatism, in nine of which tonsillitis was present for three to seventeen days before the rheumatic outbreak, and in the rest the throat was more or less inflamed during the attack.

Menzer says that the entrance gate for bacteria in acute articular rheumatism is in the large majority of cases, though not all, the tonsils.

Adler says that rheumatic attacks may follow a very mild tonsillitis.

Miller reports two cases of polyarthritic inflammation, in which he believes the infection was due to frequent attacks of tonsillitis.

Bruck believes that in all forms of rheumatism the tonsils form the gate of entrance par excellence for the infection.

Trousseau was probably the first to show the relation between tonsillitis and rheumatism.

Lagranere and Pipounier showed that acute articular rheumatism was accompanied by rheumatic angina, which occurred sometimes before, sometimes with, and sometimes after, the beginning of the rheumatic attack.

Caesar Boeck reports an epidemic of angina lacunaris, during the convalescence of which the patients regularly developed acute articular rheumatism.

Lasegue reports several cases showing the relationship between these two diseases.

Brown describes a regular epidemic of tonsillitis in school children with rheumatic complications.

Stephanides reports a case of repeated attacks of rheumatism cured by extirpation of the tonsils.

Whipham collected six hundred and fifty-five cases of acute articular rheumatism in which inflammation of the tonsils played a most important part.

Roos reports six cases of angina followed by articular rheumatism.

Peltesohn says that "angina lacunaris, acute articular rheumatism, muscular rheumatism, and certain diseases of the skin occurring with these, are etiologically diseases very close to each other."

Goodale says that in a certain percentage of cases the good operative results following the removal of tonsils seem to justify the theory that the faucial tonsils may constitute an infection atrium for rheumatic arthritis.

CHRONIC RHEUMATISM.—Gurich has claimed to be able to differentiate between chronic articular rheumatism due to tonsillar infection and that due to other causes by removing the tonsil. In the tonsillar infection cases the operation is followed by a reaction in the involved joints. Out of one hundred and two cases of chronic articular rheumatism which were thus diagnosed as due to tonsillar irritation, ninety-eight were permanently healed by the removal of the tonsils.

Goodale has recently shown a relation between certain cases of chronic arthritis and the presence of retained débris in the tonsillar tissue.

GENERAL INFECTION.

Otten reports two cases of general staphylococcic infection originating from the tonsils.

Woodcock reports one case of pyemia and phlebitis following tonsillitis with abscess, which was cured with antistreptococcic serum.

Stengel, White, and Evans report one case in which the streptococcus was found in the blood and in the tonsils.

Tishutkin reports one case of fatal septicemia originating from a collection of pus in the right tonsil.

Edson describes one case of septicemia which he believes was probably caused by an infection of the tonsil.

Wainwright reports one case of fatal pyemia following tonsillitis.

Owen reports one case of septicemia following tonsillitis.

Jessen reports four cases of general infection following tonsillitis.

Buschke reports four cases of systemic infection following tonsillitis.

Adler reports two fatal cases of general septic infection, in which he believes the infecting germ originated from a mild tonsillitis.

Anderson believes very strongly that the tonsils are frequently portals of infection.

Jacobi, while saying that the modern custom of making the tonsil exclusively responsible for the admission into the system of microbes and toxins is unjustifiable, admits that such invasion may occasionally take place.

Trautmann says that it is possible that many of the infectious diseases originate through the tonsils.

Obtulowicz has seen a case of general infection following angina.

Buss has seen a case of tonsillar inflammation followed by general infection and extensive phlegmon of the skin of the elbow.

Babes autopsied a case of septic infection of all the organs due to a moderately severe tonsillitis; streptococci were found in large numbers.

Buborst describes two cases of severe infection developing after an angina.

NEPHRITIS.

Morse reports five cases of acute nephritis following tonsillitis.

Hammerschmidt reports five cases of nephritis following tonsillitis.

Adler says that 75% of all cases of tonsillitis are accompanied by a mild type of nephritis, which occasionally becomes chronic.

Thouvenet reports one case of nephritis subsequent to an attack of acute tonsillitis.

Baduce reports four cases of angina followed by nephritis, in which the diplococci of pneumonia were found in the blood until the case was cured.

Jeppe saw five cases of angina with nephritis.

Czajkowski reports seven cases of acute nephritis associated with angina lacunaris.

TENOSYNOVITIS.

Tracy reports two cases of acute tenosynovitis following acute tonsillitis.

ENDOCARDITIS.

Ross reports one case of streptococcic endocarditis following tonsillitis. Streptococci were found both in the blood and in the tonsils. He believes that in most cases of infectious diseases tonsillitis is a prominent symptom.

Charrin reports one fatal case of staphylococcic endocarditis following an attack of acute tonsillitis.

Mayer reports one case of endocarditis following an attack of tonsillitis.

Packard reports five cases of endocarditis in which he believes that the infection gained access to the blood through the tonsils.

BRONCHITIS.

Hammerschmidt reports six cases of bronchitis occurring in healthy men, following tonsillitis.

PNEUMONIA.

Hammerschmidt reports two cases of bronchopneumonia and two cases of lobar pneumonia following tonsillitis.

Adler reports one case of streptococcic pneumonia resulting from a streptococcic tonsillitis.

Wallace reports one case of pneumonia following a severe inflammation of the throat.

PLEURISY.

Heddaeus reports one case of pleurisy and pneumonia following a staphylococcic tonsillitis. He believes the pneumonia to be a coincidence, the pleurisy due to the staphylococcus.

Huguenin reports one case in which double-sided pleurisy developed after a severe angina due to the staphylococcus pyogenes aureus.

Gouguenheim reports one fatal case of pleurisy and pericarditis following streptococcic angina.

APPENDICITIS.

Forchheimer reports one case of appendicitis following tonsillar infection.

Freeman (discussing Forchheimer's paper) reports one case of appendicitis following tonsillitis.

Mitchell reports one case, coming on a few days after the onset of tonsillitis, and later followed by nephritis and endocarditis.

JAUNDICE.

Forchheimer reports five cases of jaundice following tonsillitis; three to ten days elapsing between the onset of the two diseases.

PHLEBITIS.

Trumbull reports one case of fatal phlebitis following tonsillar infection.

Wagner reports two cases from which an apparently slight angina produced a suppurative thrombosis of the jugular vein, followed by pyemia. Streptococci were found in the tonsils and vein.

Hager and Sahli report cases similar to those of Wagner.

MENINGITIS.

Hammerschmidt reports one case of meningitis due to Fraenkel's diplococcus, which organism was also found in the tonsil.

Perigord reports one case of fatal meningitis following abscess in the left tonsil.

De Guelder reports one case of streptococcic angina complicated with meningitis.

PAROTITIS.

Hammerschmidt reports twenty-five cases of parotitis, and all except one were accompanied sooner or later by tonsillitis; three before, fifteen at the same time, only six after the parotitis had set in.

SKIN LESIONS.

Le Gender reports four cases of erythema following tonsillitis.

Leven reports one case of scleroderma following tonsillitis.

Legendu and Claisse report one case of erythema developing during an attack of streptococcic tonsillitis.

Bruck reports four cases of rheumatica purpura following tonsillitis.

EYE LESIONS.

Vergely reports one case of phlegmon of the orbit, directly following acute tonsillitis.

While the above synopsis of literature concerning tonsillar infection is not a complete list of all that has been written on this subject, it is sufficiently extensive to show that the idea of systemic infection arising through the tonsils is a very general one and not limited to any individual or to any country. Further, a perusal of these articles has given me the distinct impression that the authors of these various papers have been impressed with the importance of the tonsil as a gateway for infection.

The importance of this literature to the thought which I have attempted to develop is that it unquestionably shows that if the micro-organism has access to the tonsil parenchyma, it is possible that it may pass from there into the blood. As has been stated by Boeri, it is the exception, if indeed it ever happens, that bacteria can pass through a normal blood-vessel wall; hence, for the micro-organism in the tonsil to gain access to the blood it must pass through the cervical lymph-nodes, entering the innominate vein via the jugular lymph-trunk. As the lymph-chain of the neck presents a rather formidable barrier against the invasion of micro-organisms, the large majority of patients suffering from microbic infection of the tonsil pass through the disease without any true bacteremia. On the other hand, the absorption by the blood-vessels, of toxins which have been elaborated in the tonsils is a process which accompanies almost every lesion in this organ dependent upon bacteria. The marked systemic depression noticeable in acute tonsillitis is an example.

The relation which the upper respiratory tract holds to pleurisy, as far as the blood route is concerned, can now be quite definitely stated. In a large majority of persons the tonsils act as a source from which bacterial products of greater or less toxicity may gain access to the general system. Further, it can be conceived that there is a degree of toxicity which under ordinary circumstances, as found in the healthy person, would have absolutely no influence. In a person who has been subject to attacks of pleurisy, possibly dependent upon a pulmonary condition, it can readily be conceived that the absorption of toxic substances from the tonsils may be a direct exciting cause to further pleuritic disturbances. In those much rarer cases wherein bacteria themselves gain access to the blood from the tonsils, if the pleura for some reason presents a place of lessened resistance the bacteria may be deposited at this point and there develop.

On the other hand, if the person be in a normal state of health there is no reason why the pleura should suffer from tonsillar

infection more than any other portion of the body. This statement is borne out not only by investigation, but also by clinical observation, as shown by reported cases.

We shall now consider the lymphatic infection. A lymphatic infection is naturally propagated via the lymphatic system, passing readily through the vessels, but retarded at each lymph-gland until the functional activity of that node has been overcome. Therefore, concerning lymphatic infection of the pleura from the throat, it is essential, first, to find out whether there normally exist lymphatics connecting the upper deep cervical lymph-glands with the apical parietal pleura; second, if such do not exist, whether diseased processes by cutting off the normal flow of lymph can produce a collateral circulation, whereby lymph from the upper glands of the neck may come in contact with the pleura or its regionary glands.

The lymph-glands of the neck are divided into two groups, the superficial and the deep; the superficial glands drain into the deep ones, generally into the gland which is anatomically the nearest neighbor. The superficial lymph-nodes do not fall within the scope of the present article.

The deep glands situated on each side of the neck comprise from fifteen to thirty nodes on an average, although these figures do not represent the extremes of variation. This group of glands is variously termed the carotid chain, the substernomastoid group, or the deep lateral glands of the neck, and may theoretically and clinically be divided into two groups, although anatomically they seem to make up one continuous mass. They extend from just beneath the ear downward under the sternocleidomastoid muscle, sometimes only as far as the point where the omohyoid crosses the vessels and nerves, but occasionally reaching as far as the junction of the internal jugular and subclavian vein. A gland situated in the notch formed by these veins is for our present purposes of the utmost importance, as will be seen later.

The more superficial division of the deep lateral chain lies

posteriorly and is called the external group. The external glands are generally small, and placed in part beneath the posterior border of the sternocleidomastoid, and occasionally extend so far down the anterior border of the trapezius muscle as to come into rather close relation with the supraclavicular glands. The anterior or deeper division of the main group is placed directly over the great vessels of the neck, and is termed the internal jugular group. They are situated beneath the anterior border of the sternocleidomastoid muscle, and when enlarged may be forced anteriorly until some of them appear immediately below the angle of the jaw.

The external glands empty their lymph into the internal jugular group, which in their turn drain one into the other as they descend down the neck, finally emptying into the jugular lymph-trunk. This lymph-trunk empties into the junction of the internal jugular and subclavian veins, and on the left side of the neck is occasionally joined, just before it enters the vein, by the thoracic duct.

The supraclavicular glands occupy the subclavian triangle, and the possibility of connection between this group and the deep cervical glands of the neck is the chief contention in the question of infection from the throat reaching the pleura. The supraclavicular glands receive lympathics from the posterior part of the hairy scalp and from the muscles of the neck; also, from the skin of the arm and chest, and an efferent branch from the humoral chain of the axillary group. Their efferent duct generally empties into the jugular trunk just before it enters the vein. They are separated from the apical pleura by the axillary plexus of nerves and scalene muscles.

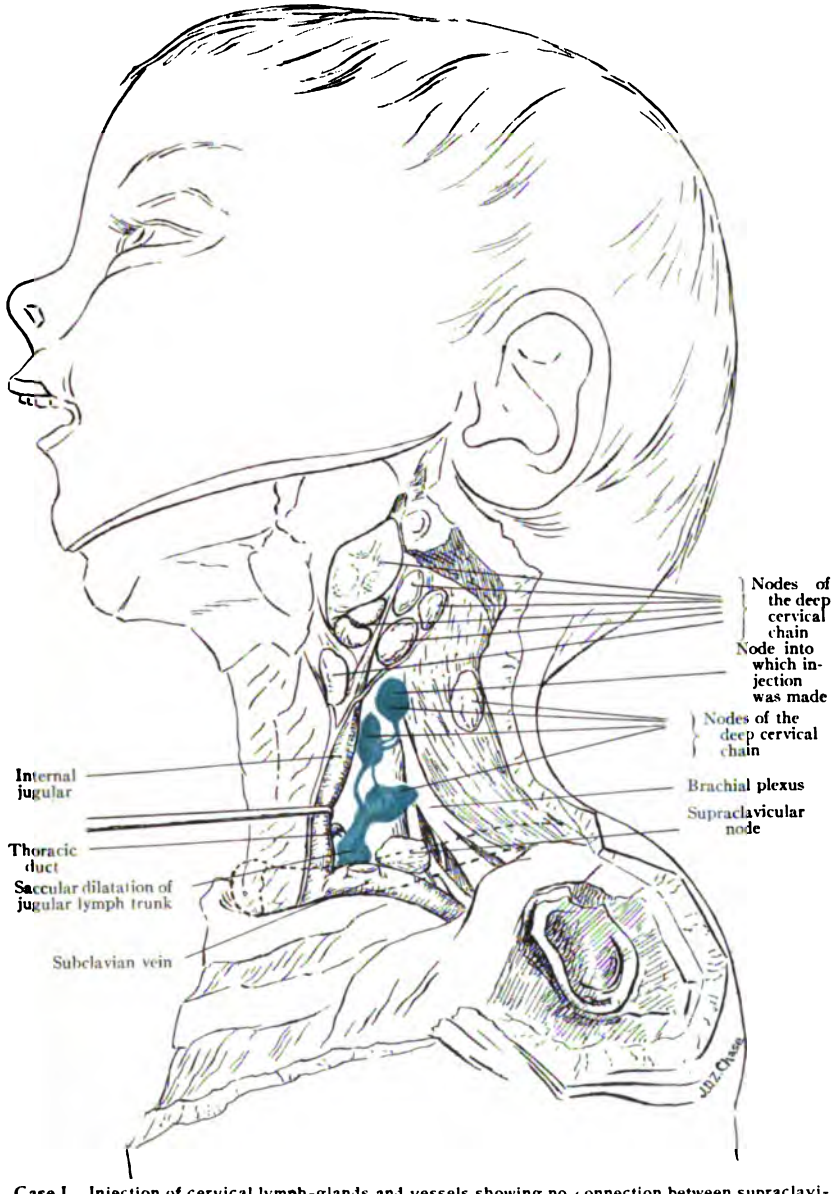
In an interesting series of experiments, Fleiner showed that the supraclavicular glands are regionary to the apex of the parietal pleura. He injected into the pleural cavities of rabbits and dogs both defibrinated blood and India ink, and killed the animals in from five to forty-five minutes afterward. The supraclavicular nodes contained blood-corpuscles when blood had been injected, and India ink particles when this had been used. He did not,

however, trace out the lymph-vessels connecting the pleura and this set of glands.

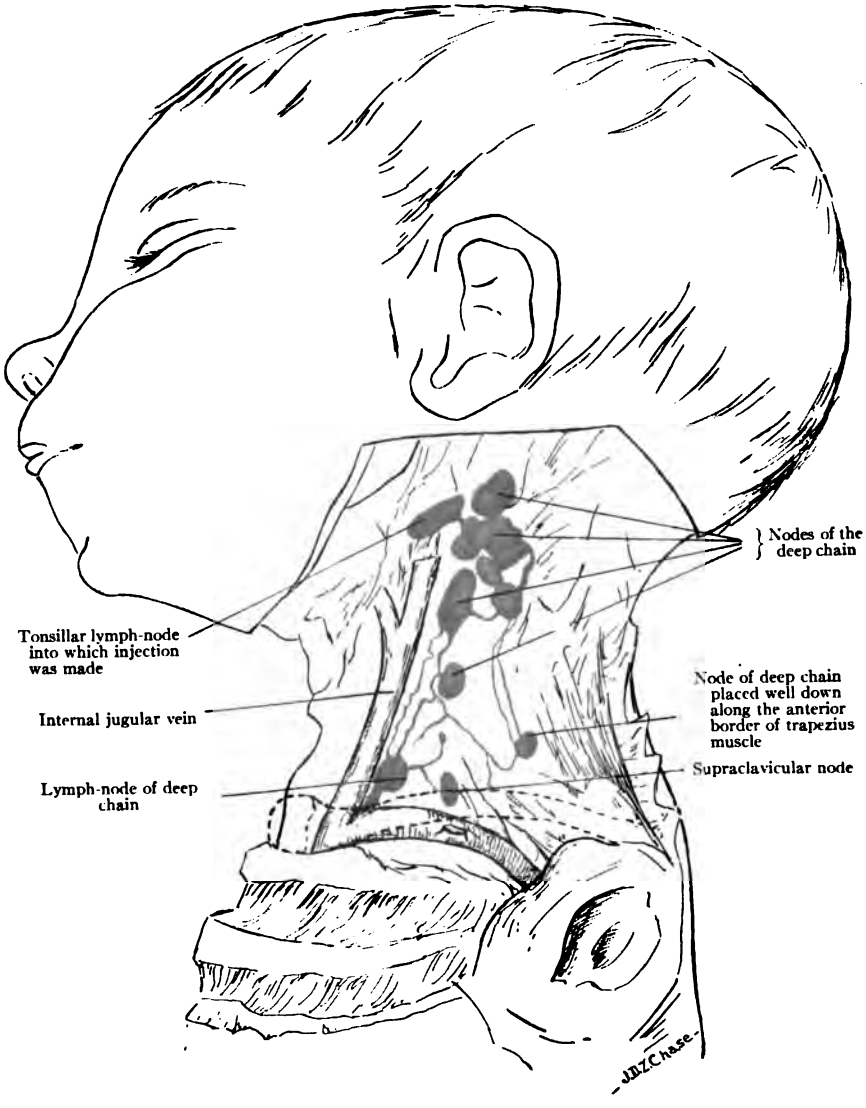
To make the chain of connection complete from the throat to the pleura there still remains to be seen whether any anastomosis exists between the supraclavicular glands and the external group of the upper deep lateral chain, the lower nodes of which sometimes reach well down along the anterior border of the trapezius.

In 1900, J. A. Grober published quite an elaborate article in which he contended that infections originating in the upper respiratory tract may pass, via the cervical lymph-nodes, not only to the pleural apices but also to the bronchial lymph-nodes. His experiments consisted in injecting a quantity of India ink into the tonsils of a dog and killing the animal six to seven days later. The cervical glands, also the mediastinal and bronchial, the lung and pleura, all showed the presence of India ink particles. The condition, however, was one of extravasation through the connective tissue of the neck rather than lymphatic absorption. Grober's work is not convincing, and he certainly does not demonstrate the presence of lymph-vessels connecting the supraclavicular with the deep cervical lymph-nodes.

Beitzke, in a most thorough and painstaking article, goes over this whole question very thoroughly. He shows that occasionally there does exist a supraclavicular gland which is separated from the pleural apices by the subclavian artery, the branchial plexus, and loose fat tissue, and which has lymphatic connection with the deep glands of the neck. This, however, is a very rare occurrence. Also that another gland, that inconstant node which sometimes occupies the angle made by the junction of the internal jugular vein with the subclavian, can be injected from the tracheo-bronchial glands. These findings would seem to indicate that in certain cases, probably more or less rare, there is direct lymphatic connection between not only the supraclavicular glands and the cervical glands, but also between the tracheo-bronchial and the cervical.



Case I. Injection of cervical lymph-glands and vessels showing no connection between supraclavicular and deep lateral glands. (See page 189.)


Nodes of the deep chain
Tonsillar lymph-node into which injection was made
Internal jugular vein
Lymph-node of deep chain
Node of deep chain placed well down along the anterior border of trapezius muscle
Supraclavicular node
J.B.Z.Chase

Case II. Injection of cervical lymph-glands from the tonsillar lymph-gland. The efferent vessel of the supraclavicular gland empties into the lowermost node of the deep lateral chain.

Beitzke then goes on and gives in detail the results of the post-mortems of forty-five children who showed some tuberculous lesion. Also, he reports a large number of experiments on guinea-pigs and rabbits. In spite of his anatomical findings, he says in his conclusions that there exists no lymph-vessel leading from the chain of cervical lymph-glands to the bronchial glands, and that infection of the lungs from the cervical nodes can only take place through the blood.

My own injections, made by Gerota's method, seem on the whole to substantiate Beitzke's findings. I will describe in some detail two injections, as they show different types of the lymphatic arrangement in the neck.

Case 1. A new-born child. A dissection was made exposing the upper deep cervical nodes. After failing to inject the whole chain from the tonsillar lymph-node, the lower glands were successfully injected from a node situated just above the omohyoid muscle. After hardening in 10% formalin for two days a careful dissection was made. The injection followed the general course downward of the jugular lymph-trunk, which terminated with a saccular dilatation at the junction of the subclavian and internal jugular veins. Just before its entrance into the vein the trunk was joined by the thoracic duct. The supraclavicular group, represented by one large node lying on the anterior fibers of the brachial plexus, was not injected. This arrangement of the gland represents a certain type of cases in which the supraclavicular and deep cervical glands are widely separated.

Case 2. A new-born child. The tonsillar lymph-gland was exposed and an injection made into this node without any further dissection. After hardening for several days in a 10% formalin solution, a dissection of the neck was made, and it was seen that the fluid had filled all the glands and the main lymph-trunks of the neck. In this dissection the upper deep chain of cervical lymph-nodes was much more extended than in Case 1, and represents a type in which the different groups are not so easily differentiated. First, there was on the anterior border of the trapezius muscle, well down toward the clavicle, a node which had extensive connections with the rest of the deep cervical chain. It did not communicate directly, however, with the supraclavicular glands, though a very small node with which this gland was connected occupied topographically a position very close to the supraclavicular

group. The supraclavicular group was here represented by one fairly large gland, which received the blue injection just as did the glands of the deep chain. The efferent vessel of the supraclavicular node terminated in the lymph-node situated in the notch formed by the junction of the internal jugular and subclavian veins. This gland also received the terminal efferents of the deep cervical chain. The jugular lymph-trunk was the efferent of this gland and consequently was very short, as the distance between it and the junction of the veins was exceedingly small. This node was separated from the apical pleura only by the common carotid artery and connective tissue, and was therefore in closer proximity to the apex of the pleura than was the supraclavicular node.

Case 2 is very instructive in that it demonstrates the close relation which may exist in certain cases between the supraclavicular glands and the lower lying of the deep cervical chain. While in this case there did not seem to be any connection between the glands on the anterior edge of the trapezius and the supraclavicular glands, they are topographically very closely related, and knowing the variability of lymph-glands and vessels generally it is conceivable that there may be cases in which anastomosis between these two groups exists. Such have been reported by Beitzke. Further, the injection of the supraclavicular gland took place evidently against the current and was due to the node situated in the venous notch obstructing the downward flow, so that the fluid on entering this node probably passed as readily up the efferent of the supraclavicular gland as into the jugular trunk.

From a study of these cases and of the literature it seems that there must be a great variance in the anatomical arrangements not only of the individual nodes of one group, but also of the relations of one group to another. In a large majority of cases the cervical lymph-nodes are separate from the supraclavicular, but it is probable that in isolated cases there exists some lymphatic anastomosis between these two groups. If we accept Fleiner's statement concerning his work, we must believe that the supraclavicular are regionary to the parietal pleura at the apex, and then the chain from tonsil to pleura is completed. In a few injections

in which I tried to find lymph-vessels connecting the pleura with the supraclavicular nodes I failed absolutely, but this negative finding does not prove anything.

One other way for an injection to reach the pleural apex from the supraclavicular gland is through the continuity of structure. If the supraclavicular glands should become enlarged, break down, and give rise to a periadenitis, the proximity of the pleura to this group of nodes makes the involvement of the pleura conceivable. The scalene muscles and some loose areolar tissue, and the brachial plexus of nerves, however, separate the glands from the pleura at this point, so that the process must be rather extensive before the pleura can be reached. The node occupying the venous notch and belonging to the deep cervical group comes in closer relation to the apical pleura than the supraclavicular glands, being separated from it only by the carotid artery and its sheath. Enlargement of this node sufficient to cause displacement either anteriorly or posteriorly would bring its capsule into almost direct contact with the pleura. A cellulitis originating from this node might, therefore, quite easily infect the apex of the parietal pleura. We must remember, however, that this gland is the terminating node of the deep chain, and in the large majority of instances the infection does not pass the barriers presented by the glands higher up. Again, it is not a constant condition, its absence being much more common than its presence, so that, considering the question from all sides, it is doubtful whether many cases of pleura infection ever arise directly from it.

It would seem that if the supraclavicular nodes were in the path of infection some light might be obtained on the present question by a careful histological study. This group of nodes, therefore, was taken post-mortem from a number of cases of pulmonary tuberculosis and carefully examined microscopically. Some of the glands were found to be normal, others showed adenitis, and the majority more or less tuberculous change. If it had been found that these glands constantly showed advanced and espe-

cially old tuberculous lesions, it would be an indication that they were in the route of the original infection; a constant negative finding would indicate otherwise. The pathological changes, however, occupied such a midway position as to throw no light whatever upon the etiological importance of these nodes.

During the study of these glands some other interesting conditions were noted, and for this reason the examinations are recorded. In describing the size of the nodes only an arbitrary measure is used. If the gland was considerably less in size than a pea, it is called very small; if about the size of a pea, it is termed small; if about the size of an almond, it is termed moderate; if about the size of a cherry, large; and any larger than a cherry, very large. Both the number and size of the glands varied very markedly in different individuals.

In recording the amount of tuberculous change as found in the glands, I have used the term "slight" when only one, two, or three tubercles were to be found; "moderate" when less than one-third of the gland was involved; and "markedly tuberculous" when more than one-third was involved.

Case 1. Eight glands examined.
Three very small ones showed marked tuberculosis.
One moderately large one showed slight tuberculosis.
Two very small ones showed no tuberculosis.
In all of these six a moderate degree of proliferative adenitis and some anthracosis were seen.
One small gland showed slight tuberculosis, with slight proliferative adenitis
One small gland was normal.

Case 2. Only one moderately large gland examined. This gland showed moderate tuberculosis, with slight congestion.

Case 3. Two large glands examined.
One showed marked tuberculosis with slight fibrosis, slight congestion, and slight anthracosis. There was also a little hyaline degeneration.

One gland showed slight tuberculosis with a moderate proliferative adenitis, and a moderate amount of hyaline change.

Case 4. Seven glands examined.

One very small gland showed slight tuberculosis with slight proliferative adenitis; also some blood in the lymph-sinuses with slight congestion.

One large gland showed a moderate degree of tuberculosis, with slight proliferative adenitis.

In none of the other glands could any tuberculous changes be found. The remaining five glands were very small, and all showed a slight degree of proliferative adenitis. In four of them there was some blood in the lymph-sinuses.

Case 5. Fourteen glands examined.

One very small gland showed slight tuberculosis with congestion.

Four small glands showed moderate tuberculosis, and one of them was congested.

One moderate-sized gland showed moderate tuberculosis with slight hyaline changes.

One moderate-sized gland showed slight tuberculosis, but also marked fibrosis with anthracosis and congestion.

The remaining seven glands did not show any tuberculous changes. One very small gland was fibrous, and there were some hyaline degeneration and congestion. Three very small glands were normal. One small gland was slightly congested, and two moderate-sized glands were slightly congested.

Case 6. Eight glands examined. None were tuberculous

One very small gland was normal.

One small gland was normal.

Two small glands showed slight anthracosis, one of them was slightly congested.

One small gland deeply congested, with slight fibrotic changes.

One moderate-sized gland showed congestion and slight fibrosis.

One moderate-sized gland showed slight anthracosis.

One large gland showed slight anthracosis.

Case 7. Four glands examined.

One very small gland showed slight tuberculosis and slight proliferative adenitis.

Two small glands showed slight proliferative adenitis, but no tuberculosis.

One large gland was slightly tuberculous, but otherwise normal.

Case 8. Twelve glands examined.

Six very small glands showed marked tuberculosis.

One very small gland showed slight tuberculosis.

Two very small glands were normal.

Two moderate-sized glands showed moderate tuberculosis, and one of them also slight hyaline degeneration.

One large gland was markedly tuberculous.

Case 9. Two glands only examined.

Both were small; one showed slight tuberculosis, with slight proliferative adenitis and slight anthracosis; the other had a moderate degree of tuberculosis and some anthracosis.

Case 10. Two glands examined.

One very small gland showed slight tuberculosis with slight proliferative adenitis, some fibrosis and some hyaline degeneration.

One small gland showed moderate tuberculosis, with marked fibrosis.

Case 11. Four glands examined.

Three small glands, one was normal, one showed moderate degree of tuberculosis, one was slightly fibroid.

One moderate-sized gland showed a moderate degree of tuberculosis and some fibroid changes.

Case 12. Two glands examined.

Both were large, and showed a moderate degree of anthracosis and some fibroid changes.

One had a suspicion of tubercle.

One had two tubercles, with slight caseation, but no distinct giant cells.

Case 13. Three glands examined.

One very small gland.

Two large glands.

All showed marked tuberculosis, with marked fibrosis and some blood in the lymph-sinuses.

Case 14. Six glands examined.

Three small glands.

Two moderate-sized glands.

One large gland.

No tuberculous changes were found, but there was a marked proliferative adenitis, and the lymph-sinuses contained a large quantity of blood which was being taken up by endothelial phagocytes.

Case 15. Six glands examined.

Five very small glands showed slight proliferative adenitis, only one of them slight tuberculosis.

One small gland showed slight proliferative adenitis and slight tuberculosis.

Case 16. Four glands examined.

All showed marked tuberculosis. Two very small, one large, one very large.

Case 17. Sixteen glands examined.

Nine very small glands were normal.

Two very small glands showed slight tuberculosis, one of them distinct proliferative adenitis with marked hyaline degeneration.

One moderate-sized gland showed slight tuberculosis and some fibrous nodules, which may have been scars of old tubercles.

One moderate-sized gland showed marked tuberculosis, but was otherwise normal.

Three large glands; two showed slight tuberculosis with proliferative adenitis and some hyaline change, and one showed marked tuberculosis with fibrous nodules.

TABULATED CASES.

Anthracosis,	6
Blood in lymph-sinuses	3
Adenitis,	10
Fibrosis,	7
Tuberculosis,	15
Hyaline degeneration,	5
Congestion,	4

TABULATED SUPRACLAVICULAR GLANDS.

	Very Small.	Small.	Moderate.	Large.	Very Large.	Total.
Tuberculosis, slight,.....	8	2	3	6	..	19
" moderate,.....	..	7	5	..	..	12
" marked,.....	14	..	1	4	1	20
Proliferative adenitis,.....	21	7	3	4	..	35
Anthracosis,.....	6	2	2	3	..	13
Blood in lymph-sinuses,....	8	3	2	1	..	14
Fibrosis,.....	5	4	3	2	..	14
Congestion,.....	3	4	5	1	..	13
Hyaline degeneration,.....	4	..	2	3	..	9
Normal,.....	15	3	..	..	..	18

It is unfortunate that in the removal of these glands from the body there was no record kept of the side from which the glands were taken, so that a comparative study with the condition of the lungs and pleura is not possible.

In all, one hundred and one glands were examined, taken from seventeen different bodies.

The importance of the size of the gland in the diagnosis of tuberculosis has, I believe, been overestimated. While the large glands were generally tuberculous, they were not always so, and very small nodes, so small as not to be palpable through the skin, and only found by careful dissection, were frequently the seat of quite extensive disease. The frequency with which proliferation of the endothelium of the lymph-nodes was noticed shows that these glands are subject often to some form of irritation, as would be caused by the presence of a weak toxic substance. This proliferative adenitis was found in 37.6% of all the glands examined. In a large number of the bodies examined there was mixed infection of the lungs, and, as has been suggested by Fleiner, the supraclavicular glands being regionary to the apices of the pleura, it is very probable that the toxins elaborated in the apical lesions pass from thence to the apical pleura, and then find their way to these supraclavicular nodes. In conjunction with this fact it will be noticed that in 12.8% anthracosis was present, and in 13.8%

blood was found free in the perilymph-sinuses. Now, as it has been shown, there is in the majority of cases generally no connection between the cervical lymph-nodes proper and the supraclavicular glands, and further it would be quite unlikely that extraneous substances could find their way down through the whole cervical chain into these glands. It cannot be conceived that sufficient dust or coal particles can be absorbed through the skin to give such a marked anthracosis as was found in some of these supraclavicular glands. The only possible source, therefore, for anthracotic material to gain access to this set of glands is from the lungs. The coal-dust passing from the lungs into the pleural cavity, and then being absorbed by the parietal pleura, passes to the regionary glands. In the same way hemorrhage, in cases of phthisis, gives the presence of blood in the lymph-sinuses of these nodes precisely as Fleiner found in his experiments. The presence of anthracosis and free blood in the supraclavicular nodes, therefore, is very strong evidence of Fleiner's contention, that the supraclavicular glands receive lymph-vessels from the parietal apical pleura.

SUMMARY.

In summing up briefly the relations between throat infections and diseased conditions of the pleura, according to the data outlined in the present paper, I believe that the following statements are justifiable.

An infecting focus of the upper respiratory tract, and this is most frequently found in the tonsils, may give rise to a pure toxemia or even to a bacteremia. Toxemia is a very frequent condition, and because of its frequency is the most important form of infection coming from the tonsils. Bacteremia originating from the throat is comparatively rare, though a large number of cases have been reported. In either condition, if the pleura is a point of least resistance, as it is in a large majority of phthisical patients, it may very easily be more or less affected by the poison

circulating in the blood. The faucial tonsils may present unrecognizable foci of infection, causing in many individuals a mild toxemia, which toxemia, however, is of importance only when the resistance of the individual is below normal.

In exceptional cases there may exist lymphatic anastomosis between the deep cervical lymph-nodes and the supraclavicular glands. It is probable that the supraclavicular glands receive afferent lymph-vessels which drain the parietal apical pleura. Occasionally the efferent of the supraclavicular gland empties into a node situated in the notch formed by the junction of the subclavian and internal jugular veins. This node may also receive the efferent lymph-vessels of the deep cervical lymph-nodes, and is only separated from the pleural apices by the internal carotid artery and its sheath. It is conceivable that lesions of this gland might cause a retrograde current which would carry the infection to the supraclavicular nodes, or a periadenitis of this node might possibly involve the pleura directly through continuity of structure. The necessary links in this infection, however, are so numerous and independent one of the other, that only in very rare cases would it happen that they would all be present so as to form a direct path from the throat to the pleural apex.

BIBLIOGRAPHY.

SECONDARY TUBERCULOSIS OF THE TONSILS.

Seifert: Handbuch der Laryn. u. Rhin., P. Heymann, ii, 714.

Schlenker: Untersuchungen über die Tuberculose der Halsdrüsen, besonders über ihre Beziehungen zur Tuberculose der Tonsillen. Inaug. Diss. Zurich, 1893, u. Virchow's Arch., 1893, cxxxiv.

Schlesinger: Die Tuberculose der Tonsillen bei Kindern. Berlin. Klinik, 1896, xcix.

Walsham: Latent tuberculosis of the tonsil. British Med. Journ., May 7, 1898. Lancet, June 18, 1898.

Ito: Untersuchungen über die im Rachen befindlichen Eigangspforten der Tuberculose. Berlin. klin. Wochen., 1903, xl, 27.

Dmochowsky: Ueber sekundäre Erkrankung der Mandeln und der Balgdrüsen an der Zungenwurzel bei Schwindsüchtigen. Ziegler's Beitr. zur pathol. Anat., x, 481.

Kruckmann: Ueber die Beziehungen der Tuberkulose der Halslymphdrüsen zu der Tonsillen. Virchow's Archiv., cxxxviii, 3.

Strassmann: Ueber Tuberkulose der Tonsillen. Virchow's Archiv., 1884, xcvi, 319.

Ozeki: Die Tuberkulose der Tonsilla palatina. Diss., Würzburg., 1899.

Gourc: Die W. Meyersche Mandel, ein Beiträg zur Bacteriologie der Adenoidgeschwülste. Thèse de Paris, 1897.

Cornil: Sur la tuberculose larvee de trois amygdales. Semaine Médicale, 1895, 223.

TONSILLAR ABSORPTION.

Goodale: Absorption of foreign bodies by the human faucial tonsil, especially in regard to the origin of infectious processes. Arch. f. Laryn. u. Rhin., 1897, vii, 90.
Hendelsohn: Absorption by tonsils. Arch. f. Laryn. u. Rhin., 1898, No. 8, 476.
Kayser: Absorption by tonsils. Therap. Woch. v. Schnirer., Oct. 17, 1897.

ETIOLOGY OF RHEUMATISM.

C. Wall: A case of serous pleural effusion, following acute rheumatic arthritis and pericarditis. London Lancet, 1905, i, 793.
W. V. Shaw: Acute rheumatic fever and its etiology. Journ. Path. and Bacteriol., 1903–4, ix, 158.
G. W. Webster: Etiology of acute articular rheumatism. Journ. Amer. Med. Assoc., 1903, xl, 80.
R. I. Cole: Etiology of acute articular rheumatism. N. Y. Med. Journ., 1906, lxxxiii, 534.
G. B. Lonstaff: A contribution to the etiology of rheumatism. Tr. Epidemiol. Soc., London, 1905, n. s., xxiv, 33.
E. S. Hawthorne: Acute rheumatism; five cases of apparently direct infection. British Med. Journ., 1903, ii, 1638.
C. Phillip: Zur Etiol. des acuten Gelenkrheumatism. Deutsch. Arch. f. kl. Med., 1903, lxxvi, 150.
A. P. Luff: Discussion on rheumatoid arthritis and the morbid conditions which simulate it. British Med. Journ., Oct. 26, 1907.
R. I. Cole: Experimental streptococcus arthritis in relation to the etiology of acute articular rheumatism. Journ. Infectious Diseases, I, 1904, 714.

TONSILLITIS AND RHEUMATISM.

H. Suchannek: Relations of angina to acute rheumatism of the joints. Bresgen's Sammlung zwangl. Abhandl., u. s. w. Heft 1.
Joseph Meitus: Tonsillitis and its relation to rheumatism. Cincinnati Lancet-Clinic, March, 1896.
F. A. Packard: Infection through the tonsils, especially in connection with acute articular rheumatism. Phila. Med. Journ., 1900, 957.
St. Clair Thompson: Rheumatic fever in relation to the throat. Laryngoscope, x—xi, 1901, 23.
A. Jacobi: The pharynx and nose in rheumatism. N. Y. Med. News, Dec. 15, 1900.
A. Stengel: Articular rheumatism. Amer. Journ. Med. Sci., n. s., cxxv, 1903, 412.
R. T. Turner: Acute rheumatism. Three cases of apparently direct infection. British Med. Journ., 1903, ii, 311.
T. McCrae: Acute articular rheumatism. Journ. Amer. Med. Assoc., xl, 1903, 211.
Chas. F. Kuhn: Tonsillitis and its complications. The Physician and Surgeon, xxviii, 1906, 164.
P. W. Williams: The throat as a source of systemic infection in acute rheumatism. Bristol Med. Chir. Journ., xxii, 1904, 215.
A. C. Miller: Tonsillitis as a prodrome to acute articular rheumatism. Columbus Medical Journal, April, 1904.
Editorial: The tonsils as portals of rheumatic infection. Journ. Amer. Med. Association, Jan. 19, 1901.
Gurich: Ueber die Beziehungen zwischen Mandelerkrankungen und dem akuten Gelenkrheumatismus. Münch. med. Wochens., 1905.
E. Fletcher Ingalls: The relation of tonsillitis to rheumatism. Laryngoscope, xvii, 1907, 712.
J. Phillips: Acute articular rheumatism. Cleveland Medical Journal, December, 1906.
G. Epstein: Angina, erythema exsudativum multiforme, pleuritis exsudativa dextra. Wien. kl. Rundschau, 1905, xix, 73.
Hammerschmidt: Ueber den Zusammenhang der Mandelentzündung mit anderer Krankheiten Deutsch Militarärzt. Ztsch., xxxii, 1903, 257.

Menzer: (Quoted by Hammerschmidt.)
Isaac Adler: Remarks on some general infection through the tonsils. N. Y. Med. Journ., 1906, lxxxiii, 641.
D. J. M. Miller: Infection through the tonsils. N. Y. Med. Journ., 1905, lxxxi, 1036.
Bruck: Purpura rheumatica und angina. Berl. kl. Wochensch., 1900, xlv, 1005.
Trosseau: Clinique médicale de l'Hôtel Dieu, 1895.
Lagranère and Pipounier: Essay sur les angines rheumatism et goutteuses. Thèse. Paris. 1876.
Caesar Boeck: Referat in Schmidt's Jahrbücher, 1882, xix, S. 33.
Lasègue: Archives générales de Médicine, 1880.
H. Brown: Brit. Med. Journ., Sept. 14, 1889.
Stephanides: Prag. med. Wochensch., No. 50, 1885.
Whipham: Report of the Investigation Committee of the British Medical Association. Brit. Med. Journ., Feb. 25, 1888.
Roos: Ueber rheumatische Angina. Berlin. klin. Wochensch., xxv, xxvi. 1894.
F. Peltesohn: Ueber Angina und Rheumatismus. Archiv für Laryngol. und Rhinol., 1897–98.
Gurich: Der Gelenkrheumatismus, sein tonsillarer Ursprung und seine tonsillare Heilung. Published by Max Woywod, Breslau, 1905.
J. L. Goodale: Some considerations relative to systemic infection through the tonsillar ring. The American Laryngological Association, 1907.
E. Maragliano: Importenza della tonsilla per la etiologia della poliartrite reumatica. Gazett. degli ospedali., xxx, Marz 10, 1901.

TONSILLLITIS AND GENERAL INFECTION.

E. Lexer: The mucous membrane of the throat as a port of entrance for pyogenic infection. Arch. f. kl. Chir., Bd. 54, 1897, 736.
Piera: Die Drusen des Waldeyer'schen Schlundringes, special die Gaumentonsillen betrachetet als Eingangsforte für Microorganism. Arch. Ital. d. Laringol., April 1, 1900.
M. Otten: Staphylococcusmycosis. Deutsch. Arch. f. kl. Med., xc, July, 1907.
G. A. Woodcock: Pyemia and phlebitis complicating tonsillitis, with report of case. Iowa Med. Journ., Des Moines, x, 1904, 256.
Stengel, White and Evans: Cryptogenetic streptococcus infection with persistent cutaneous eruption, enlargement of the lymphatic glands and fever, suggesting syphilis. University of Penna. Med. Bul., xix, 1906, 217.
Tishutkin: Case of deadly poisoning, caused by virulent micrococci in the tonsil. Wratsch, No. 9, 1897.
C. E. Edson: Case of septicemia treated with normal salt solution. Boston Med. and Surg. Journ., July, 1899.
W. L. Wainwright: Tonsillitis accompanied by rapidly fatal pyemia. Brit. Med. Journ., ii, 1897, 651.
I. Owen: Case of blood poisoning from tonsillitis; comparative results obtained from two varieties of antistreptococcic serum and from perchlorid of iron. London Lancet, Oct. 15, 1904.
F. Jessen: Ueber die Tonsillen als Eingangspforte für schwere Allegemeininfectionen. Münch. med. Wochensch., No. 23, 1898, 709.
Buschke: The tonsils as the entrance gates for pyogenic microorganisms. Deutsch. Ztschrift. f. Chir., xxxviii, 1894, 441.
Isaac Adler: Remarks on some general infection through the tonsils. N. Y. Med. Journ., lxxxiii, 1906, 641.
W. S. Anderson: Infection through the tonsils. N. Y. Med. Journ., lxxxi, 1905, 852.
A. Jacobi: Infection by way of the tonsil. N. Y. Med. Journ., lxxxiv, 1906, 360.
Trautmann: Bedeutung der nasalen Athmung in ihrer Schutz und Heilwirkung auf Krankheiten. Monatsch. f. Ohrenheilkunde. Berlin, xxxvi, 1902, 530.
Obtulowicz: Intern. Centralb. f. Laryngol., Bd. v, S. 213.
Buss: Ueber bakterielle, haemorrhagische Infectionen des Menschen. Wiener med. Wochen., No. 36 u. ff. 1892.

Babes: Ibid.
Dubost: Sur les complications septicémiques et pyohémiques des angines aigues non diphthériques. Thèse de Paris. 1896.

TONSILLITIS AND ENDOCARDITIS.

J. S. Ross: The rôle played by the tonsils in organismal diseases. Med. Press and Circ., London, 1906, n. s. lxxxi, 333.
Charrin: Staphylococcic endocarditis. Located on the pulmonary valve, originating from the tonsils. Semaine Méd., March 14, 1896.
E. Mayer: The tonsils as portals of infection. Journ. Amer. Med. Assoc., Dec. 2, 1899.
F. A. Packard: Endocarditis of tonsillar origin. Boston Med. and Surg. Journ., May 25,

TONSILLITIS AND NEPHRITIS.

J. L. Morse: Tonsillitis a cause of acute nephritis. Arch. of Pedr., 1904, 337.
Hammerschmidt: Ueber den Zusammenhang der Mandelentzündung mit anderer Krankheiten. Deutsch Militarärzt. Ztsch., xxxii, 1903, 257.
I. Adler: Remarks on some general infection through the tonsils. N. Y. Med. Journ., lxxxiii, 1906, 641.
A. Thouvenet: Tonsillar nephritis. N. Y. Med. Journ., May 5, 1894.
Baduce: La settimana medicale 1896. Deutsch. Med., No. 34, 1896.
Jeppe: Internat. Centralb. f. Laryng., Bd. vii, S. 438.
Czajkowski: Ueber Complicationen der idiopathischen acuten Pharyngitis. Internat. Centralbl. f. Laryngol., Bd. ix, S. 21.

TONSILLITIS AND BRONCHITIS.

Hammerschmidt: Ueber den Zusammenhang der Mandelentzündung mit anderer Krankheiten. Deutsch. Militarärzt. Ztsch., xxxii, 1903, 257.

TONSILLITIS AND PNEUMONIA.

Hammerschmidt: Ueber den Zusammenhang der Mandelentzündung mit anderer Krankheiten. Deutsch. Militarärzt. Ztsch., xxxii, 1903, 257.
Adler: Remarks on some general infection through the tonsils. N. Y. Med. Journ., 1906, lxxxiii, 641.
W. Wallace: Septic pneumonia following inflammation of the throat. Lancet, Feb. 15, 1896.

TONSILLITIS AND PLEURISY.

A. Heddaeus: Tonsillitis acuta durch Staphylococcus pyogenes aureus. Pleuritis exudativa metastat. Diplococcuspneumonia. Thoracotomie, sepsis exitus. München. med. Wochen., No. 18, 1897, 467.
Huguenin: Ueber kryptogenetische Pleuritis. Correspondenzblatt f. Schweizer Aerzte. No. 3. 1893.
Gouguenheim: Annales des maladies de l'oreille, x, October, 1896.

TONSILLITIS AND PHLEBITIS.

J. Trumbull: Infective phlebitis as a sequel to follicular tonsillitis. N. Y. Med. Rec., Aug. 9, 1890.
Wagner: München. med. Wochen., No. 9, 1892.
Hager: Intern. Centralb. f. Laryngol., Bd. v, S. 212.
Sahli: Deutsches Archiv. f. klin. Med., Bd. li, 1893.

TONSILLITIS AND MENINGITIS.

Hammerschmidt: Ueber den Zusammenhang der Mandelentzündung mit anderer Krankheiten. Deutsch. Militarärzt. Ztsch., xxxii, 1903, 257.

Perigord: Ein Fall von infectioser Angina. Limousin médical. Aout, 1893.
De Guelder: Streptokokken-Angina mit Meningitis. Annal de la Soc. Med. Chir. d'Anvers., Mai and Juni, 1901.

TONSILLITIS AND APPENDICITIS.

Forchheimer: Diseases from tonsillar infection. Arch. of Pedr., xix, 1902, 656.
Freeman: Ibid.
E. W. Mitchell: Amygdalitis, followed by appendicitis, nephritis and endocarditis. Arch. of Pedr., xx, 1903, 182.

TONSILLITIS AND SKIN LESIONS.

Le Gender: Amygdalitis and cutaneous eruptions. N. Y. Med. Journ., April 23, 1892.
Leven: Fall von Sclerodermie nach Angina. Dermat. Centralb., v, 1902, 4.
Legendu and Claisse: Purpura and erythema papulo-nodosum, occurring during an attack of streptococcic tonsillitis. Semaine Méd., 1892, 10.
Bruck: Purpura rheumatica and angina. Berl. kl. Wochen., xlv, 1005.

TONSILLITIS AND PAROTITIS.

Hammerschmidt: Ueber den Zusammenhang der Mandelentzündung mit anderer Krankheiten. Deutsch. Militarärzt. Ztsch., xxxii, 1903, 257.

TONSILLITIS AND EYE LESIONS.

Vergely: Krankenvorstellung. acute Mandelentzündung; drohende Phlegmone der Orbita. Journ. d. med. d. Bordeaux, xxix, July 19, 1896.

TONSILLITIS AND JAUNDICE.

Forchheimer: Diseases from tonsillar infection. Arch. of Pedr., xix, 1902, 656.

TONSILLITIS AND TENOSYNOVITIS.

Tracy: Acute tenosynovitis following tonsillitis. Boston Med. and Surg. Journ., July 25, 1907.

ON THE LYMPHATIC INFECTION OF THE PLEURA.

Beitzke, H.: Ueber den Weg der Tuberkelbazillen von den Mund. und Rachhöhlen, mit besonderer Berucksichtigung der Verhältnisse beim Kinde. Virchow's Archiv. f. p. Anat., Berl., clxxxiv, 1906, l.
Bunting, T. L.: The histology of lymph glands: the general structure, the reticulum, and the germ centres. J. Anat. and Phys., London, xxxix, 1904–5, 55.
Buttersack: Wie erfolgt die Infection der Lungen. Ztschr. f. kl. Med., 29, 1896, 411.
Fleiner: Ueber die Resorption Corpusculäres Elemente durch Lungen und Pleura. Virch. Archiv., Bd. 112, 1888, S. 97.
Flicker: Ueber die Aufnahme von Bakterien durch den Respirationsapparat. Arch. f. Hyg., Bd. 53, S. 50.
Gerota: Zur Technik der Lymphgefassinjektion. Anat. Anzeiger, Bd. 12, 1896, S. 216.
Grober: Die Infektionswege der Pleura. Deut. Arch. f. kl. Med., Bd. 68, 1900, S. 296.
Von Ruck: The relation of pleurisy to tuberculosis. N. Y. Med. Journ., lxxxii, 1905, 695.

GEORGE BACON WOOD.

TUBERCULOSIS OF THE BONES AND JOINTS.

The first description of tuberculosis of bone was made by Boerhaave. The process was considered as a caries beginning in the interior of the medullary canal. In 1676 Wiseman applied the term "tumor albus" to all joint lesions running a chronic course. He believed that they were usually due to scrofula. Nélaton applied Laennec's discovery of the unity of phthisis and scrofula to the osseous system, showing that many chronic suppurative lesions in bone were of tuberculous origin. In 1844 Rokitansky demonstrated the identity of the process in certain cases of bone tuberculosis with phthisis of the lungs. Finally Koch established by animal inoculations the presence of the tubercle bacillus in bone and joint lesions.

In reviewing the clinical histories of the Henry Phipps Institute for the first four years it is evident that almost none of the cases were admitted for bone tuberculosis alone. The applicant supposed that he had consumption of the lungs and therefore applied for treatment. It is undoubtedly for this reason that in the series of cases here reported but four showed uncomplicated bone tuberculosis.

In the four years from February 1st, 1903, to February 1st, 1907, four thousand eight hundred and forty patients were examined at the Institute; and of these, three thousand seven hundred and thirty-three showed some tuberculous lesion, for the most part pulmonary. Of the three thousand seven hundred and thirty-three, only fifty-five, or 1.47%, gave a history of tuberculosis of the bones or joints. Twelve of the fifty-five cases gave such meagre data regarding their osseous lesions that the tuberculous

nature of the same cannot be positively averred, yet from the general character of the symptoms recorded it was considered proper to record them with the others as true tuberculosis of bone.*

In considering the etiology of bone lesions it is well to remember that osseous tuberculosis is almost invariably secondary in origin. The parts affected are not exposed to the outside and the tubercle bacillus must be conveyed from another part by means of the blood or lymph channels. Traumatism is generally conceded to be an important predisposing factor, but in the present series sufficient facts were not at hand to determine the part it played. It is of interest to note, however, that forty-one (74.55%) were males and only fourteen (25.45%) were females, while only 58.31% of the three thousand seven hundred and thirty-three tuberculous cases examined were males and the remainder females. This discrepancy may possibly be explained in part by the fact that males are more exposed to injury than females.

The source of contagion in all the fifty-five cases is difficult to trace, but in twenty-three there was at least a possibility of contagion from parents, brothers, sisters, or other associates who had suffered or died from some form of tuberculosis during or preceding the development of the bone complications. In thirty of the cases no definite history of contagion could be discovered, so far as the bone complications were concerned.

Two of the fifty-five cases stand out distinctly from the rest on account of their mode of origin, namely, Nos. 3949 and 4116. In these the ribs and sternum underwent necrosis or caries by a direct extension of the tuberculous process from the lungs. Both of the patients were males between thirty and forty years of age, and the pulmonary disease was so far advanced that death ensued shortly after the records were obtained.

The theory has been advanced that the etiology of bone tuber-

* These twelve cases are the following: Cases Nos. 366, 785, 821, 864, 991, 1543, 2003, 3000, 3772, 3960, 4431, 4452. The clinical histories are abstracted at the end of the article.

culosis differs from that of the pulmonary variety, and it has even been asserted that osseous lesions are caused by the bovine tubercle bacillus, and pulmonary lesions by the human organism. In this connection it is of interest to note the relations existing between the pulmonary and the osseous processes in the present series.

In four, that is, 7.28%, of the fifty-five cases no pulmonary tuberculosis was demonstrated. In two of these the bone disease was active at the time of examination and in two quiescent. In the remaining fifty-one, or 92.72%, pulmonary lesions were demonstrated. In thirty-two of these the pulmonary disease was in a very early stage and was described as incipient. The process was generally confined to the apex, usually of one lung. In these cases the bone lesion was quiescent in eighteen, active in thirteen, and not recorded in one. In nine of the fifty-one patients showing pulmonary complications the pulmonary process was moderately advanced, the bone lesion being quiescent in six, active in two, and not recorded in one. In ten the pulmonary disease was far advanced, the bone lesion being quiescent in five, active in four,* and not recorded in one. In the fifty-one cases, therefore, of combined osseous and pulmonary disease the bone process was quiescent in 56.86%, active in 37.25%, and not recorded in 5.88%.

By further analysis of these cases it is found that in four the pulmonary process was the primary one, and in each instance the bone disease was in an active state at the time of the examination. In thirty the bone disease was apparently the predecessor of the pulmonary lesion, but of these thirty, only six showed active bone tuberculosis, while twenty-four gave evidence of an arrested or latent process, so that the pulmonary complication may have been due to a new infection. In seventeen of the cases it was impossible to ascertain from the history whether the pulmonary or bone infection was primary.

* This includes the two cases of tuberculous caries of the ribs caused by contiguity to the tuberculous lung tissue.

In the earlier histories of the Institute no regular record was made of the lymphatic glands; thus, in twenty-six of the fifty-five cases there is no mention made of the glandular system. In the remaining twenty-nine, however, the following facts are noted: In nine the glands were normal, in fourteen enlarged, especially the cervical glands, and in six there was a definite history of tuberculous adenitis of one or more groups of glands.

Cheyne[1] states that of three hundred and eighty-six patients who were under his observation for tuberculous bone or joint complications, during a period of three years, 10.8% became affected with or died of phthisis or tuberculous meningitis. He also says that Billroth and Menzel, in a search of the post-mortem records at Vienna from 1817 to 1867, a period of fifty years, found two thousand one hundred and six cases of carious disease of bones and joints, and 52% of these were complicated with tuberculosis of the internal organs.

According to Koenig,[2] only 21% of cases of tuberculous bone and joint affections are free from other tuberculous foci. This estimate was made after very exhaustive studies of sixty-seven cadavers showing tuberculosis of the bones or joints.

Orth,[3] in sixty-seven autopsies made in the Göttingen Clinic from subjects of bone or joint tuberculosis, found older foci, other than those of the bone or joint, fifty-three times, that is, in 79%. Thirty-seven of these were in the lungs and twenty-one in the lymph-glands.

Tuberculosis of the osseous system shows a marked predilection for the earlier years of life. In the fifty-five cases here reported the period of activity of the bone complication ranged from the first to the fiftieth year. According to decades there were sixteen between one and ten years; thirteen between ten and twenty; seven between twenty and thirty; six between thirty and forty, and two between forty and fifty; in seven the period of activity could not be determined and in four the patients were affected some time between one and twenty, but which decade

was not stated. Thus there were thirty-three, or 60%, in which the bone disease was active during the first twenty years of life. This approximates Billroth's estimate that one-half of all cases of bone tuberculosis occur during the first two decades of life.

Statistics generally agree that the vertebræ are far more susceptible to the invasion of the tubercle bacillus than the other bones of the body. Cheyne[4] has combined the cases collected by Jaffe, Schmalfuss, Billroth and Menzel with six hundred and two other cases collected by himself. From this extensive material he has tabulated the following figures showing the relative frequency of tuberculosis in various regions of the skeleton:

Spine	23.2%	Sternum, clavicle, and ribs	5.2%
Knee-joint	16.5%	Pelvis	3.5%
Hip-joint	14.6%	Femur, tibia, and fibula	3.5%
Tarsus and ankle	14.4%	Shoulder	1.5%
Elbow-joint	6.3%	Scapula, ulna, and radius	1.0%
Wrist and hand	6.0%	Humerus	0.8%
Skull and face	5.5%	Patella	0.1%

The bones affected in the fifty-five cases treated at the Henry Phipps Institute were the following:

Spine	22 = 40.00%	Ribs and sternum	2 = 3.63%
Hip-joint	12 = 21.81%	Shoulder	1 = 1.81%
Knee-joint	6 = 10.90%	Entire arm	1 = 1.81%
Femur	2 = 3.63%	Hip and femur	1 = 1.81%
Elbow-joint	2 = 3.63%	Hip and knee	1 = 1.81%
Jaw	2 = 3.63%	Tibia and femur	1 = 1.81%
Bones of forearm	2 = 3.63%		

Altogether there were fifty-eight different bones and joints affected. In fourteen cases the hip-joint was diseased, in seven the knee-joint, and in four the femur.

The following are the cases in detail, which gave evidence of definite tuberculous lesions of the osseous system. In each case the following items are noted so far as the history gave the record:

Sex, race, age, occupation, history of contagion, pulmonary complications at time of examination, including date of onset, hemoptysis, presence or absence of cough, sputum characteristics,

the degree of pulmonary involvement,* the presence of tuberculosis of the glands, description of the osseous lesion, including the date of onset, present state, *i. e.*, active or latent or arrested, and the part affected, and the result or condition of the pulmonary and osseous lesions when the patient was last seen.

Case No. 9. Age, twenty-seven. Male. White. Race, not recorded. Entered dispensary, 2 : 11 : '06; stopped treatment, 5 : 21 : '03. Physician, Walsh. Occupation, not recorded. History of contagion, mother died of consumption when the patient was seven years old; a brother and a sister died of consumption within the last three years. Clinical diagnosis, tuberculosis of the lungs and of spinal vertebræ. Pulmonary disease: duration, not definitely stated; hemoptysis, not recorded; cough, absent; sputum, none; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: date of onset, not recorded; process, active; pain over the lower part of the back and kyphosis of the spine. A note states that later pain developed in the back and right groin, with signs of a psoas abscess. The patient died shortly after this. Bone disease, Pott's.

Case No. 93. Age, twenty-five. Male. White. Race, not recorded. Entered dispensary, 2 : 21 : '03. Stopped treatment, 12 : 21 : '03. Physician, Walsh. Occupation, plumber. History of contagion, two sisters died six years ago of galloping consumption. Clinical diagnosis, tuberculosis of the lungs and of hip-joint. Pulmonary disease: duration, nine years; hemoptysis, present; cough, in morning; sputum, considerable amount, yellowish-white; tubercle bacilli, not found; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease, twenty-one years ago, when four years of age, the patient had hip-joint disease (which hip is not recorded). It is not definitely recorded whether the process was active at the present examination, but it appears to have been a healed case. Final result, not recorded. Bone disease, coxalgia.

Case No. 174. Age, forty-five. Female. Spanish-French. Entered dispensary, 3 : 19 : '03 Stopped treatment, 5 : 28 : '03. Physician, Irwin. Occupation, seamstress. History of contagion, father died of consumption.

* In describing the degree of pulmonary involvement the Roman numerals I, II, III, have been employed, according to Turban's scheme of classification, and the terms incipient, moderately advanced, and far advanced according to the classification of the Committee on Nomenclature of the National Association for the Study and Prevention of Tuberculosis as given in the Transactions of the Second Annual Meeting.

Clinical diagnosis, tuberculosis of the lungs and of spinal vertebræ. Pulmonary disease: duration, not recorded; hemoptysis absent; cough, in the morning; sputum, considerable amount, yellowish; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: duration, eight years; pain in the region of the fifth dorsal vertebra; process, active. Result, not recorded. Bone disease, Pott's.

Case No. 366. Age, twenty-three. Female. Negro. Entered dispensary, 4 : 1 : '03. Stopped treatment, 9 : 31 : '04. Physicians, Stanton and Ullom. Occupation, maid. History of contagion, not recorded. Clinical diagnosis, tuberculosis of the lungs and of hip-joint. Pulmonary disease: onset, two years ago; hemoptysis, present; cough, on rising and sometimes all night; sputum, large quantity; tubercle bacilli, not found; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: process started many years ago and is now arrested, one leg (which one is not stated) is shorter than the other and the pelvis is tilted. Result of general condition, improved. Bone disease, coxalgia.

Case No. 499. Age, twenty-eight. Male. Syrian. Entered dispensary, 4 : 23 : '03. Stopped treatment, 5 : 12 : '03. Physician, Brinton. Occupation, laborer. History of contagion, negative. Clinical diagnosis, tuberculosis of the lungs and of spinal vertebræ. Pulmonary disease: possibly began six months ago; hemoptysis, absent; cough, at night and in the morning; sputum, scant, yellowish; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, not recorded, Osseous disease: a small abscess developed four months ago in the region of the ninth and tenth dorsal vertebræ, communicating with a necrotic area in these bones; process, active. Result, not recorded. Bone disease, incipient Pott's.

Case No. 649. Age, forty-six. Male. English. Entered dispensary, 5 : 13 : '03. Stopped treatment, 6 : 30 : '05. Physicians, Stanton and Ullom. Occupation, laborer. History of contagion, negative. Clinical diagnosis, tuberculosis of the lungs and of the hip-joint. Pulmonary disease: onset, probably five years ago; hemoptysis, present; cough, at night; sputum, fairly large quantity, yellowish; tubercle bacilli, present; stage and involvement II, moderately advanced. Glandular complications, not recorded. Osseous disease: duration, not recorded; the left hip is ankylosed. Result, unimproved. Bone disease, arrested coxalgia.

Case No. 664. Age, seven. Male. Russian. Entered dispensary,

5 : 15 : '03. Made only one visit. Physician, Landis. History of contagion, negative. Clinical diagnosis, tuberculosis of spinal vertebræ. Lungs, apparently normal; hemoptysis absent; cough, in morning; sputum, none. Glandular complications, not recorded. Osseous disease: duration, twenty months; a marked scoliosis to the left caused by acute caries of the vertebræ. Result, not recorded. Bone disease, Pott's.

Case No. 693. Age, twenty-three. Male. Race, not recorded. Entered dispensary, 5 : 22 : '07. Made only one visit. Physician, Walsh. Occupation, cutler. History of contagion, patient has worked with consumptives. Clinical diagnosis, tuberculosis of the lungs and of spinal vertebræ. Pulmonary disease: hemoptysis, present; cough began about one year ago, worse in the morning; sputum, considerable amount, yellowish; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: duration, four or five years; a prominence of the first lumbar and slight depression of the second lumbar vertebræ; process, latent. Result, not recorded. Bone disease, Pott's.

Case No. 785. Age, nineteen. Male. Russian. Entered dispensary, 6 : 21 : '03. Died in the hospital, 12 : 24 : '03. Physician, Norris. Occupation, mill-hand. History of contagion, mother died at twenty-nine of phthisis and a half brother at thirteen of tuberculosis. Clinical diagnosis, tuberculosis of the lungs and hip-joint. Pulmonary disease: duration, fifteen months; hemoptysis, present; cough, during the day; sputum, profuse and greenish, many tubercle bacilli; stage and involvement III, far advanced. Glandular complications, none recorded. Osseous disease, there are no details given, simply the diagnosis. Result, death. Bone disease, coxalgia.

Case No. 821. Age, thirty-four. Male. Russian. Entered dispensary, 6 : 6 : '03. Stopped treatment, 11 : 30 : '05. Physician, Stanton. Occupation, brass polisher. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, probably about one year and three months; hemoptysis, none; cough, none; sputum, slight amount; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: date of onset not stated; hunchback due to marked kyphosis of the dorsal spine with a depression from the ninth to the tenth dorsal vertebra, slight curvature to the right. Result, general improvement. Bone disease, arrested Pott's

Case No. 824. Age, twenty-two. Female. Negro. Entered hospital,

6 : 8 : '03. Stopped treatment, 9 : 7 : '03. Physician, Stanton. Occupation, housework. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and knee. Pulmonary disease: duration, about four months; cough, frequent; hemoptysis, none; sputum, large amount, containing tubercle bacilli; stage and involvement II, moderately advanced. Osseous disease: onset about fifteen years ago; at this time there was a tumor albus of the right knee which was operated upon and subsided, leaving a rigid joint. Result, patient went home from the hospital very ill from pulmonary complications. Bone disease, arrested tuberculous arthritis of knee.

Case No. 845. Age, thirty-eight. Male. Race, not recorded. Entered dispensary, 6 : 9 : '03. Made only one visit. Physician, Landis. Occupation, upholsterer. History of contagion, father died at forty-one years of age of phthisis. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, four to six months; hemoptysis, none; cough, in morning; sputum, slight amount; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: duration, two years; condition, active; there is a psoas abscess pointing in the right groin, evidently from an old bone lesion; four months ago, when cough began, pain and a swelling developed at the left sacrosciatic notch, the pain running down the leg; at present the pain is referred to the knee; thigh of left leg is atrophied. Result, not recorded. Bone disease, Pott's.

Case No. 864. Age, sixty-two. Female. Race, not recorded. Entered dispensary, 6 : 11 : '03. Stopped treatment, 6 : 25 : '03. Physician, Norris. Occupation, nurse. History of contagion, a sister died at thirty years of age of tuberculosis. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, twenty years; hemoptysis, present; cough, in morning; sputum, large amount; tubercle bacilli, none found; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: duration, about twenty years; there is a marked scoliosis showing evidence of spinal disease which is now arrested. Result, not recorded. Bone disease, arrested Pott's.

Case No. 901. Age, thirty-five. Male. Anglo-American. Entered hospital, 6 : 16 : '03. Stopped treatment, 12 : 11 : '04. Physician, Brinton. Occupation, woodchopper. History of contagion, sister died of tuberculosis at twenty-two. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, not stated; hemoptysis, none; cough, on retir-

ing; sputum, large amount; tubercle bacilli, present; stage and involvement II, moderately advanced. Glandular complications, not recorded. Osseous disease: duration, about fifteen years; there is a scoliosis of the dorsal spine to the right side, caries about the fourth dorsal vertebra, with a psoas abscess; two incisions were made at the Philadelphia Hospital and half a gallon of pus was evacuated; swelling in the groin recurred and was relieved by the use of potassium iodide. Result, improved. Bone disease, Pott's.

Case No. 991. Age, forty-two. Male. Irish. Entered dispensary, 7 : 3 : '03. Stopped treatment, 9 : 18 : '03. Physician, Landis. Occupation, bricklayer. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, eighteen months; hemoptysis, none; cough, on rising; sputum, considerable amount; tubercle bacilli, not recorded; stage and involvement II, moderately advanced. Glandular complications, not recorded. Osseous disease: there is a marked kyphosis which has existed since infancy, with bulging of the right side of the chest. No record of result. Bone disease, probably arrested Pott's.

Case No. 1091. Age, twenty-two. Male. English. Entered dispensary, 7 : 21 : '03. Died in hospital, 8 : 26 : '03. Physician, Walsh. Occupation, worked in an umbrella factory. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and the femur. Pulmonary disease: duration, more than three months; hemoptysis, present: cough, at night; sputum, large amount; tubercle bacilli, not recorded; stage and involvement III, far advanced. Glandular complications, not recorded. Osseous disease: duration, thirteen years; at nine years of age the patient had tuberculous disease of the hip and necrosis of the right femur; this process is now arrested and the scars may be seen over the femur. Result, death from pulmonary tuberculosis. Bone disease, arrested tuberculosis of the femur and hip-joint.

Case No. 1543. Age, twenty-nine. Male. Race, not recorded. Entered dispensary, 9 : 30: '03. Stopped treatment, 4 : 29 : '04. Physician, Hatfield. Occupation, bookbinder. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, two years; hemoptysis, none; cough, at night; sputum, none; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: duration, not recorded; there is a marked kyphosis and curvature to the left of the spinal column from the seventh dorsal to the first lumbar vertebra. Result, went to White Haven sanatorium, no record of result. Bone disease, arrested Pott's.

Case No. 1639. Age, forty. Female. Russian. Entered dispensary, 10 : 24 : '03. Stopped treatment, 7 : 2 : '04. Physician, Hatfield. Occupation, housework. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and hip-joint. Pulmonary disease: duration, five or more years; hemoptysis, present; cough, in the morning; sputum, slight amount; tubercle bacilli, no examination; stage and involvement II, moderately advanced. Glandular condition, not recorded. Osseous disease: patient had hip-joint disease in childhood, and there is now a scoliokyphosis to the left in the dorsal region of the spine; there are abscess scars over both breasts; there was pain in the sacral region suggesting tuberculous disease. Result, death. Bone disease, arrested coxalgia.

Case No. 1923. Age, thirty-eight. Male. Austrian. Entered hospital, 12 : 29 : '03. Stopped treatment, 1 : 7 : '04. Physician, Brinton. Occupation, carder in mill. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, eighteen years; hemoptysis, present; cough, in morning; sputum, scant; tubercle bacilli, present; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: duration, over two years; there is an abscess in the upper and outer part of the right thigh; there has been pain in this region for over one year and pain in the back for two years. Result, not recorded. Bone disease, Pott's.

Case No. 2003. Age, thirty-seven. Male. Negro. Entered dispensary, 1 : 19 : '03. Stopped treatment, 4 : 29 : '04. Physician, Landis. Occupation, porter. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and knee. Pulmonary disease: duration, at least four months; hemoptysis, none; cough, at night; sputum, large amount; tubercle bacilli, no record of examination; stage and involvement II, moderately advanced. Glandular complications, not recorded. Osseous disease: the left leg was amputated eleven years ago for what was probably a tuberculous arthritis of the knee. Result, not recorded. Bone disease, old tumor albus of the knee.

Case No. 2013. Age, thirty. Male. Race, not recorded. Entered dispensary, 1 : 21 : '04. Stopped treatment, 5 : 28 : '04. Physician, Norris. Occupation, metal polisher. History of contagion, mother died at fifty of phthisis. Clinical diagnosis, tuberculosis of the lungs and elbow-joint. Pulmonary disease: duration, not recorded; hemoptysis, none; cough, in the afternoon; sputum, large amount; tubercle bacilli, present. Stage and in-

volvement I, incipient. Glandular complications, some of the lymphatic glands are tuberculous. Osseous disease: has been sick for two years with a discharging sinus of the right elbow. This still persists. Result, arrested pulmonary disease. No record of elbow. Bone disease, active tuberculous arthritis of the elbow.

Case No. 2082. Age, twenty-nine. Male. English. Entered dispensary, 2 : 9 : '04. Stopped treatment, 3 : 4 : '04. Physician, Fetterman. Occupation, lace weaver. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and femur. Pulmonary disease: duration, two and one-half years; hemoptysis, present; cough, in the morning; sputum, large amount; tubercle bacilli, not recorded; stage and involvement III, far advanced. Glandular complications, tuberculous adenitis of the right groin. Osseous disease, twelve years ago patient had an abscess of the right femur and has had seven operations on it. Result, pulmonary disease, unimproved. Bone disease, old tuberculous necrosis of the femur.

Case No. 2090. Age, thirty-four. Male. Nova Scotian. Entered dispensary, 2 : 13 : '04. Stopped treatment, 4 : 5 : '04. Physician, Müller. Occupation, shoemaker. History of contagion, father died of phthisis. Clinical diagnosis, tuberculosis of the lungs and hip-joint. Pulmonary disease: duration, four months; hemoptysis, none; cough and dyspnea, present; sputum, large amount; tubercle bacilli, present; stage and involvement I, incipient. Glandular complications, scar on the right side of the neck indicating an old operation for cervical adenitis. Osseous disease: duration, seven years; there is a discharging sinus over the great trochanter of the left femur. Result, unimproved. Bone disease, active coxalgia.

Case No. 2474. Age, thirty-four. Male. Austrian. Entered dispensary, 6 : 6 : '04. Stopped treatment, 9 : 30 : '05. Physician, Carncross. Occupation, shirt-maker. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, probably sixteen or seventeen years; hemoptysis, none; cough, at night; sputum, small amount; tubercle bacilli, none found; stage and involvement II, moderately advanced. Glandular complications, not recorded. Osseous disease, sixteen or seventeen years ago there developed marked kyphosis of the spine from the seventh or eighth dorsal vertebra to the second or third lumbar. Result, not recorded. Bone disease, arrested Pott's.

Case No. 2858. Age, twenty-six. Female. Negro. Entered dispen-

sary, 11 : 2 : '04. Stopped treatment, 12 : 2 : '04. Physician, Rhoads. Occupation, housework. History of contagion, one sister died of phthisis one and a half years ago. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, one and a half years; hemoptysis, none; cough, in morning; sputum, small amount; tubercle bacilli, not recorded. stage and involvement I, probably very incipient. Glandular complications, not recorded. Osseous disease, seven years ago developed Pott's disease; this is now arrested and there remains a slight lateral curve over the lower spine with lordosis in the lumbar region so that patient walks with a limp. Result, not recorded. Bone disease, arrested Pott's.

Case No. 2907. Age, eight. Female. Irish. Entered dispensary, 11 : 18 : '04. Stopped treatment, 12 : 18 : '04. Physician, Wood. Occupation, school-girl. History of contagion, father is in an advanced stage of consumption. Clinical diagnosis, tuberculosis of the lungs, hip, and knee. Pulmonary disease: duration, probably not more than five years; hemoptysis, present; cough, at night; sputum, small amount; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, tuberculous glands of the neck. Osseous disease: duration, more than six years; there is a scar on the hip and ankylosis of the knee. The latter was operated on about six years ago. Result, not recorded. Bone disease, arrested tuberculosis of the hip and knee joints.

Case No. 2982. Age, ten. Male. Russian Jew. Entered dispensary, 12 : 15 : '04. Stopped treatment, 7 : 21 : '05. Physician, Fetterman. Occupation, school-boy. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and hip. Pulmonary disease: duration, one or more years; cough, at night; hemoptysis, none; sputum, slight amount; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: duration, about eight years. Result, improved. Bone disease, arrested tuberculosis of the left hip.

Case No. 3000. Age, thirty-five. Male. English. Entered dispensary, 12 : 20 : '04. Made only one visit. Physician, Cruice. Occupation, bridge-builder. History of contagion, has lived in houses with consumptives. Clinical diagnosis, tuberculosis of the lungs and jaw. Pulmonary disease: duration, about two and a half years; hemoptysis, none; cough, at night; sputum, profuse; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: two and a half years ago developed caries of the jaw probably of tuberculous origin. This

has now healed. Result of pulmonary disease, not recorded. Bone disease, probably arrested tuberculous caries of the jaw.

Case No 3077. Age, three. Male. Race, not recorded. Entered dispensary, 1 : 18 : '05. Stopped treatment, 1 : 28 : '05. Physician, Rhoads. Occupation, none. History of contagion, was frequently taken by mother to the sick-room of a consumptive. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration; probably more than one year; hemoptysis, none; sputum, none; cough, at night; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: bottle-fed baby; was in the hospital a year ago with present trouble; at that time there was kyphosis of the spine, and later limbs became paralyzed, so that he was unable to walk. Result, slightly improved. Bone disease, probably active Pott's.

Case No. 3110. Age, eighteen. Male. Russian Jew. Entered dispensary, 1 : 30 : '05. Stopped treatment, 10 : 16 : '05. Physicians, Carncross, Fetterolf. Occupation, tailor. History of contagion, may have contracted the disease from a consumptive who lived in the same house. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, about one and a half years; hemoptysis, none; cough, in morning and evening; sputum, large amount; tubercle bacilli, none; stage and involvement I, incipient. Glandular complications, not recorded. Osseous disease: has had spinal disease since childhood; the chest is frightfully distorted, with marked curvature of the dorsal spine to the left. Result, both pulmonary and osseous processes appear to be arrested. Bone disease, arrested Pott's.

Case No. 3255. Age, eighteen. Female. Race, not recorded. Entered dispensary, 4 : 24 : '05. Died, 5 : 7 : '05. Physician, Fetterman. Occupation, none. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and probably of bones of arm. Pulmonary disease: duration, apparently only five weeks; hemoptysis, yes; cough, at night; sputum, large amount; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, none. Osseous disease: duration, about fourteen years, when the arm was broken, and for eight there was a purulent discharge; this is now healed; there are old scars on both forearms apparently from old tuberculous caries. Result, death. Bone disease, necrosis of bones of arm, possibly tuberculous.

Case No. 3273. Age, forty-two. Male. Race, not recorded. Entered

dispensary, 4 : 28 : '05. Stopped treatment, 12 : 31 : '05. Physician, Brinton. Occupation, teamster. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and hip. Pulmonary disease: duration, one or more years; hemoptysis, none; cough, in the morning; sputum, profuse; tubercle bacilli, present; stage and involvement I, incipient. Glandular complications, none. Osseous disease: at four years of age the right hip was injured and an abscess of the right thigh developed; walked on crutches for five years; now there is ankylosis of the hip with right lateral curvature of the spine, due to shortening of the leg. Result, unimproved. Bone disease, arrested coxalgia.

Case No. 3412. Age, ten. Male. Austrian. Entered dispensary, 6 : 5 : '05. Still under treatment. Physician, Hoyt. Occupation, school. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, not recorded; hemoptysis, none; cough, present; sputum, none; stage and involvement II, moderately advanced. Glandular complications, cervical lymphatics are enlarged, probably from tonsils. Osseous disease: duration, not recorded; there is slight scoliosis to the left in the dorso-lumbar region; there is marked depression just above the lumbar vertebræ, and the spinous process of the first lumbar vertebra is enlarged and tender. Result, improved. Bone disease, active Pott's.

Case No. 3471. Age, eight. Male. Irish. Entered dispensary, 6 : 23 : '05. Stopped treatment, 7 : 31 : '05. Physician, Cruice. Occupation, school-boy. History of contagion, father died of tuberculosis three years ago. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, probably seven years; hemoptysis, yes; cough, during day; sputum, large amount; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, cervical glands are slightly enlarged. Osseous disease: seven years ago patient developed caries of the spine in the region of the third dorsal vertebra. There is now a marked kyphosis in this region, the upper portion being almost at right angles with the long axis of the body. Result, not recorded. Bone disease, Pott's.

Case No. 3489. Age, thirty-one. Male. West Indian. Entered dispensary, 6 : 29 : '05. Stopped treatment, 11 : 30 : '06. Physician, Hoyt. Occupation, clerk. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and the ulna. Pulmonary disease: duration, nine months; hemoptysis, none; cough, present; sputum, small amount; tubercle bacilli, none; stage and involvement III, far advanced. Glandular complications, none. Osseous disease: duration, not recorded; there is an old arthritis of the

lower end of the ulna, also spinous process of the last dorsal vertebra. Result, improved. Bone disease, arrested tuberculous arthritis of the lower end of the ulna.

Case No. 3625. Age, twenty-five. Male. Russian Jew. Entered dispensary, 9 : 1 : '05. Stopped treatment, 2 : 28 : '06. Physician, Wood. Occupation, agent. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and knee. Pulmonary disease: duration, six years; hemoptysis, yes; cough, none; sputum, none; stage and involvement I, incipient. Glandular complications, none. Osseous disease: left knee-joint was operated on in childhood, and is now ankylosed. Result, improved. Bone disease, arrested tuberculous arthritis of the knee.

Case No. 3666. Age thirty-one. Female. Race, not recorded. Entered hospital, 9 : 28 : '05. Stopped treatment, 2 : 16 : '06. Physician, Craig. Occupation, never able to work. History of contagion, mother died of tuberculosis. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, three years; hemoptysis, none; cough, none; sputum, none; stage and involvement I, incipient. Glandular complications, none. Osseous disease: at two years of age fell and hurt spine, now the lower dorsal vertebræ show kyphoscoliosis. Result, disease arrested. Bone disease, arrested Pott's.

Case No. 3772. Age, twelve. Male. Italian. Entered dispensary, 11 : 23 : '05. Stopped treatment, 1 : 31 : '06. Physician, Carncross. School-boy. No history of contagion. Clinical diagnosis, old tuberculous arthritis of the knee. Pulmonary disease: had pleurisy six years ago; hemoptysis, none; cough, at night; sputum, small amount; tubercle bacilli, none found; stage and involvement, no pulmonary tuberculosis. Glandular complications, the cervical glands are enlarged. Osseous disease: ten years ago the right knee was crooked, but not swollen. Result, improved. Bone disease, probably arrested tuberculous arthritis of the knee.

Case No. 3949. Age, thirty-eight. Male. Irish. Entered hospital, 3 : 3 : '06. Died, 4 : 4 : '06. Physician, Hatfield. Occupation, teamster. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and ribs. Pulmonary disease: duration, about two years; hemoptysis, none: cough, yes; sputum, large amount; tubercle bacilli, present; stage and involvement III, far advanced. Glandular complications, glands are enlarged. Osseous disease: duration, not recorded; there is an abscess over the ribs and manu-

brium sterni, with caries of two of the ribs on the left side, and the sternum; there is slight spinal curvature in the dorsal region to the left. Result, death. Bone disease, acute tuberculous caries of the ribs.

Case No. 3960. Age, eighteen. Male. German. Entered dispensary, 3 : 8 : '06. Stopped treatment, 4 : 30 : '06. Physician, Montgomery. Occupation, glass cutter. History of contagion, a sister died of tuberculosis five years ago. Clinical diagnosis, tuberculosis of the lungs and jaw. Pulmonary disease: duration about two years; hemoptysis, present; cough, present; sputum, large amount; tubercle bacilli, not recorded; stage and involvement III, far advanced. Glandular complications, none. Osseous disease, for two years has had a sinus from the right side of the lower jaw, originating from an alveolar abscess. Result, not recorded. Bone disease, caries of the jaw, possibly tuberculous.

Case No. 3981. Age, eighteen. Male. Negro. Entered hospital, 3 : 20 : '06. Stopped treatment, 4 : 8 : '06. Physician, Stanton. Occupation, errand-boy. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, not recorded; hemoptysis, present; cough, in the morning; sputum, moderate amount; tubercle bacilli, none found; stage and involvement I, incipient. Glandular complications, slight enlargement of the cervical chain. Osseous disease: duration, not recorded; there is an angular projection, with swelling, pain and tenderness over the lower dorsal vertebræ. Result, not recorded. Bone disease, Pott's.

Case No. 4116. Age, thirty-six. Male. English. Entered hospital, 5 : 4 : '06. Died, 5 : 14 : '06. Physician, Hatfield. Occupation, painter. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and ribs. Pulmonary disease: duration, five or more years; hemoptysis, none; cough, present; sputum, profuse; tubercle bacilli, none; stage and involvement III, far advanced. Glandular complications, cervical glands are slightly enlarged. Osseous disease: duration, not recorded; there is a swelling over the right side of the chest, at the fifth rib, anterior axillary line, measuring five centimeters in diameter; this appears to be a cold abscess and lies over an empyema on the same side of the chest. Result, death. Bone disease, tuberculous caries of ribs.

Case No. 4169. Age, twenty-one. Female. Irish. Entered hospital 4 : 23 : '06. Stopped treatment, 8 : 30 : '06. Physician, Landis. Occu-

pation, dressmaker. History of contagion, probably from associates. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, five years; hemopytsis, present; cough, present; sputum, large amount; tubercle bacilli, present; stage and involvement III, far advanced. Glandular complications, there is enlargement of some of the glands. Osseous disease: duration, not recorded; there is a scoliosis to the left in the lower dorsal region, the lumbar vertebræ arch backward very decidedly; at the tenth dorsal vertebra is a point of marked tenderness. Result, unimproved. Bone disease, active Pott's.

Case No. 4189. Age, twenty. Female. German. Entered dispensary, 5 : 29 : '06. Stopped treatment, 6 : 30 : '06. Physician, Francine. Occupation, housework. History of contagion, mother died of tuberculosis seven years ago. Clinical diagnosis, tuberculosis of the lungs and hip. Pulmonary disease: duration, not recorded; hemoptysis, two weeks ago; cough, slight; sputum, large amount; tubercle bacilli, not recorded; stage and involvement, I, incipient. Glandular complications, cervical glands are enlarged. Osseous disease: had left-sided hip-joint disease when six years of age. Result, not recorded. Bone disease, arrested coxalgia.

Case No. 4224. Age, thirty-four. Male. Race, not recorded. Entered dispensary, 6 : 13 : '06. Died in hospital, 10 : 17 : '06. Physician, Walsh. Occupation, hat-maker. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and hip. Pulmonary disease: duration, about eighteen years. Hemoptysis, present; cough, at night; sputum, profuse; tubercle bacilli, present; stage and involvement III, far advanced. Glandular complications, none. Osseous disease: old hip-joint disease with ankylosis. Duration, not recorded. Result, death. Bone disease, arrested coxalgia.

Case No. 4296. Age, nineteen. Male. German. Entered dispensary, 7 : 16 : '06. Stopped treatment, 9 : 30 : '06. Physician, Montgomery. Occupation, not recorded. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and knee. Pulmonary disease: duration, not recorded; hemoptysis, none; cough, slight; sputum, slight amount; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, none. Osseous disease: for two years the left knee has been swollen, but not red; can be flexed to a right angle, skiagraph taken at the University Hospital showed roughening of the bone in front. Result, improved. Bone disease, tuberculous arthritis of the knee.

Case No. 4342. Age, forty-seven. Male. Russian Jew. Entered dispensary, 8 : 8 : '06. Still under treatment, 2 : 1 : '07. Physician, Cadbury. Occupation, maker of picture frames. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and vertebræ. Pulmonary disease: duration, about nine years; hemoptysis, present; cough, present; sputum, profuse; tubercle bacilli, present; stage and involvement III, far advanced. Glandular complications, some enlargement of glands. Osseous disease: onset, eight or nine years ago; had an abscess at the left sacroiliac synchondrosis, which healed in four or five years. There is a marked kyphoscoliosis. Result, improved. Bone disease, arrested Pott's.

Case No. 4403. Age, eighteen. Male. Negro. Entered dispensary, 9 : 3 : '06. Stopped treatment, 10 : 31 : '06. Physician, Cummins. Occupation, errand-boy. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and elbow. Pulmonary disease: duration, not recorded; hemoptysis, none; cough, none; sputum, none; stage and involvement II, moderately advanced. Glandular complications, about four years ago had cervical adenitis. Osseous disease: the left elbow was recently operated upon for tuberculous arthritis. Result, unimproved. Bone disease, tuberculous arthritis of the elbow.

Case No. 4431. Age, eleven. Male. Negro. Entered dispensary, 9 : 10 : '06. Stopped treatment, 10 : 31 : '06. Physician, Cummins. Occupation, school-boy. History of contagion, brother has tuberculosis of the lungs. Clinical diagnosis, tuberculosis of lungs and femur. Pulmonary disease: duration, probably less than a year. Hemoptysis, none; cough, none; stage and involvement I, incipient. Glandular complications, sick for fourteen months with cervical adenitis and has had four operations on the neck. Osseous disease: operated on one year ago on the right femur, probably for caries; disease now arrested. Result, not recorded. Bone disease, arrested caries, probably tuberculous, of the femur.

Case No. 4452. Age, eighteen. Female. Race, not recorded. Entered dispensary, 9 : 15 : '06. Still under treatment, 2 : 1 : '07. Physician, Ullom. Occupation, clerk. History of contagion, probably from aunt and cousin. Clinical diagnosis, tuberculosis of the lungs and arm. Pulmonary disease: sick for five years; hemoptysis, none; cough, in the morning; sputum, small amount; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, glands of the neck are palpable. Osseous disease: duration, not recorded; there is a cold abscess in the right arm,

extending from the wrist to the insertion of the deltoid. Result, improved. Bone disease, tuberculous caries of some part of upper extremity.

Case No. 4461. Age, fourteen. Female. Race, not recorded. Entered hospital, 9 : 17 : '06. Stopped treatment, 10 : 31 : '06. Physician, Ravenel. Occupation, mill hand. History of contagion, a sister has tuberculosis. Clinical diagnosis, tuberculous caries of bones of right arm. Pulmonary disease, none. Glandular complications, none. Osseous disease: duration one year. One year ago was struck on the arm and an abscess developed. After three operations the process has been arrested. There is also tuberculosis of the skin. Result, not recorded. Bone disease, tuberculosis of arm.

Case No. 4518. Age, seventeen. Male. Russian Jew. Entered dispensary, 10 : 8 : '06. Stopped treatment, 11 : 30 : '06. Physician, Foltz. Occupation, none. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and lower extremities. Pulmonary disease: duration, not recorded; hemoptysis, none; cough, none; sputum, none; stage and involvement I, incipient. Glandular complications, enlargement of glands in right inguinal region. Osseous disease: abscess developed over right tibia two and a half years ago; there are now also old scars on both thighs. Result, not recorded. Bone disease, arrested tuberculous caries of both femora and right tibia.

Case No. 4603. Age, eleven. Female. Negro. Entered dispensary, 11 : 7 : '06. Stopped treatment, 12 : 31 : '06. Physician, Cadbury. Occupation, none. History of contagion, mother died of consumption three years ago. Clinical diagnosis, acute inflammation with ankylosis of the left hip. Pulmonary disease, none. Glandular complications, all the lymphatics are enlarged. Osseous disease: has been sick for one year with pain in the left hip following an injury; the hip was said to have been dislocated. Result, extension was applied for about six months at the Pennsylvania Hospital and patient improved. Bone disease, coxalgia.

Case No. 4753. Age, thirty-nine. Male. German. Entered dispensary, 1 : 2 : '07. Still under treatment, 2 : 1 : '07. Physician, Ullom. Occupation, oyster business. History of contagion, brother died of phthisis three years ago. Clinical diagnosis, tuberculosis of the lungs and hip. Pulmonary disease: duration, one year; hemoptysis, none; cough, in the morning; sputum, small amount; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, there is enlargement of the glands.

Osseous disease: duration, not recorded; the right hip is involved. Result, not recorded. Bone disease, coxalgia.

Case No. 4822. Age, sixteen. Male. Italian. Entered dispensary, 1 : 22 : '07. Stopped treatment, 2 : 28 : '07. Physician, Brinton. Occupation, baker's helper. No history of contagion. Clinical diagnosis, tuberculosis of the lungs and knee. Pulmonary disease: duration, about one and a half months; cough, at night; sputum, scant; hemoptysis, none; tubercle bacilli, not recorded; stage and involvement I, incipient. Glandular complications, none. Osseous disease: about two and a half years ago fell and struck the knee; in about two months the knee became swollen. Result, knee improved, but there is a persistent tumor albus. Bone disease, tuberculous arthritis of knee.

REFERENCES.

1. Cheyne: British Medical Journal, April 11, 1891, p. 790.
2. Koenig: "Die Tuberkulose der menschlichen Gelenke," Berlin, Hirschwald, 1906, p. 2.
3. Orth, cited by Senn: "Tuberculosis of the Bones and Joints," F. A. Davis, 1892, p. 91.
4. Cheyne: British Medical Journal, April 25, 1891, p. 898.

WM. W. CADBURY.

TUBERCULOSIS OF THE LYMPHATIC GLANDS AND SKIN.

In the clinical records of the patients who have applied for treatment at the Henry Phipps Institute during the last four years there is seldom a record of previous or present tuberculosis of the lymphatic system or of the skin. The infrequency of these forms of tuberculosis among so many cases of tuberculosis makes a detailed study of them worth while.

ANALYSIS OF CASES OF TUBERCULOUS LYMPHADENITIS.

The cases reported are divided into two general groups: namely, those which presented evidence of previous tuberculous lymphadenitis, as shown by scars from former operations, discharging sinuses from broken-down tuberculous lymph-glands, or a history of glandular swelling of a tuberculous type in early life; and, secondly, those which had, at the time of the first examination, glandular swelling or enlargement resembling tuberculous lymphadenitis. No account has been taken of the cases which showed merely palpable glands, unless they were recorded as being distinctly more prominent than their fellows. As practically all cases show some grade of tuberculous lymphadenitis at autopsy, the autopsy findings have not been incorporated in the present paper, as they will be found in the pathological report, where they rightfully belong. In only one instance has a record from the post-mortem notes been used, and in this

because the enlargement of one group of glands showed what would be considered clinically tuberculous lymphadenitis.

In a total of four thousand eight hundred and forty patients examined in the wards and dispensaries of the Henry Phipps Institute during the last four years, there are only ninety-seven cases with a record of either previous or present tuberculous lymphadenitis.

Of these ninety-seven cases, sixty-six showed evidences of previous tuberculous glandular disease, sixty glandular involvement at the time of the first examination, and twenty-nine evidence of both previous and present tuberculosis of the lymph-glands at the first examination.

In the analyses of these cases an attempt has been made to study them from certain definite standpoints. Therefore, the following tables have been prepared with regard to the age at which the first development occurred, the location of the affected glands, the possibility of hereditary infection, milk (hence bovine) infection in contradistinction to human infection, the production of immunity to subsequent pulmonary infection, the primary location of the subsequent pulmonary involvement, and the probable portal of infection.

THE DEVELOPMENT OF TUBERCULOUS LYMPHADENITIS IN RELATION TO AGE BY DECADES.

One to ten years,	15	(15%)	97 cases
Ten to twenty years,	37	(38%)	
Twenty to thirty years,	15	(15%)	
Thirty to forty years,	9	(9%)	
Forty to fifty years,	7	(7%)	
Not determined,	14	(14%)	

In the above table the cases have been grouped in that decade during which the first attack of glandular tuberculosis occurred. It will be noted that the greatest number of cases occurred during the second decade, with a marked decrease as the age period advanced.

LOCATION OF GLANDULAR LESION IN CASES GIVING A HISTORY OR SHOWING EVIDENCE OF PREVIOUS GLANDULAR TUBERCULOSIS.

		Operated on.	Not Operated on.	
Right cervical,	12 cases	10	2	56 cases
Left cervical,	14 "	12	2	
Both right and left cervical,	4 "	4	0	
Side not stated—cervical,	26 "	15	11	
Axillary,	1 case	1	0	
Axillary and cervical,	3 cases	2	1	
Inguinal,	2 "	0	2	
Location not stated,	4 "	2	2	
Total,	66 cases	46	20	

In this table the location of the lesion is indicated, as also previous operations. The greatest number of cases had the lesion in the cervical lymph-glands (over 84%). Over 69% of the cases required surgical interference.

CASES SHOWING GLANDULAR INVOLVEMENT AT FIRST EXAMINATION.

		Swelling.	Fluctuation.	Sinus.	
60 cases,	Right cervical,	6	2	0	41 (over 68%)
	Left cervical,	9	1	0	
	Both right and left cervical,	3	0	0	
	Side not stated—cervical,	20	0	0	
	Right axillary,	1	0	0	
	Left axillary,	0	0	0	
	Side not stated—axillary,	1	0	0	
	Axillary and cervical, right,	1	0	0	
	Axillary and cervical, left,	0	0	0	
	Axillary and cervical, both right and left,	1	0	0	
	Axillary and cervical, side not stated,	3	0	1	
	Right inguinal,	1	0	0	
	Left inguinal,	0	0	0	
	Side not stated—inguinal,	1	0	0	
	Cervical and inguinal,	1	0	0	
	Bronchial,	1	0	0	
	Bronchial and cervical,	1	0	0	
	General glandular involvement,	5	0	0	
	Glands about left elbow,	1	0	0	

In this table the cases have been divided into those which showed swelling, those which had progressed to the stage of softening with the production of fluctuation, and those which had ruptured and produced a discharging sinus. While all the

cases ran a chronic course, and were, in the vast majority of instances, of the localized type, there were five which showed a generalized tuberculous glandular enlargement.

HEREDITY.

97 cases,	Tuberculosis in one or both parents,	27	(27.84%)
	Tuberculosis in parents' family,	1	(1.03%)
	Suspicion of tuberculosis in parents' family,	3	(3.09%)
	No history of tuberculosis in parents,	66	(68.04%)

It is conceded today that heredity plays a very minor rôle in the transmission of tuberculosis from parent to offspring. There may be some predisposition conveyed to the offspring, but some even claim that tuberculosis in the parent produces immunity in the offspring. Our cases do not show a high percentage of hereditary predisposition, only 31.96%.

POSSIBLE MILK INFECTION.

Number of cases showing tuberculous lymphadenitis in first decade,	15	Without tuberculosis in parents, 6
		Doubtful cases, 1

Though milk infection may occur at any time during life, the above table has been prepared from only those cases which gave a history of tuberculous lymphadenitis during the first decade of life, because this is the milk-drinking period. The table shows that in nearly one-half (40%) of our cases occurring during the first decade the possible source of infection may have been tuberculous milk, because in these cases there was no history of contact with tuberculous individuals, either in the family or among friends.

While the remainder of the cases may have become infected through milk, they had ample opportunity to become infected from tuberculous individuals. Therefore, while the infection may have been of bovine, it is probable that it was of human origin.

INFECTION FROM CONTACT.

Number of cases...	In contact with tuberculosis,	39	(40.21%)	97 cases
	In doubtful contact with tuberculosis,	3	(3.09%)	
	Undetermined,	55	(56.70%)	

While tuberculous lymphadenitis may be of bovine origin, many cases must be due to infection with the human species of this micro-organism. Of the ninety-seven cases here studied, 40% showed a probable human source of infection, and of these, only 31.96% had a history of possible hereditary predisposition.

GLANDULAR TUBERCULOSIS AS A PROTECTION AGAINST SUBSEQUENT PULMONARY TUBERCULOSIS.

Number of cases...
- With previous glandular tuberculosis and present pulmonary involvement,.....63 (95%)...out of 66 cases
- With previous or present glandular tuberculosis and present pulmonary involvement,.....92 (95%)
- With previous or present glandular tuberculosis without present pulmonary involvement,..... 5

} out of 97 cases

In view of the fact that some observers believe that tuberculous lymphadenitis confers a certain immunity to subsequent pulmonary infection, it is of interest to study our cases, which showed a previous or present tuberculous lymphadenitis in relation to subsequent pulmonary infection.

Of the sixty-six cases showing previous glandular tuberculosis, sixty-three (95%) showed pulmonary disease at the time of examination. It must be remembered, however, that of the many patients that have had tuberculous lymphadenitis, we see practically only those who consult us for subsequent pulmonary tuberculosis. In our cases, previous glandular tuberculosis evidently did not produce any marked immunity to subsequent pulmonary infection.

RELATIVE POSITION OF PRIMARY PULMONARY LESION AND PREVIOUS GLANDULAR LESION.

Number of cases in whom the glandular lesion and pulmonary lesion were .....
- On right side,.....10
- On left side,..... 8
- On opposite sides,..... 5
- On both sides,..... 1
- Undetermined,.....39

} 63 cases

Since the lymphatic system is composed of a vast number of intercommunicating lymph-channels which connect one chain of glands with another, draining the surrounding tissues, and there may be a direct extension of an infection not only in the

direction of the lymph-current, but also against it, due to obstruction of the lymphatics by disease, with a resultant backward flow of the lymph in its endeavor to seek new channels, we would expect to find the pulmonary lesion more frequently upon the side showing the infected glands.

If one could draw any conclusion from our cases it would be that the primary pulmonary lesion occurs about four times as frequently on the side of the previous glandular lesion as on the opposite side.

RELATIVE POSITION OF PRESENT GLANDULAR AND PRESENT PULMONARY LESIONS.

Glandular and pulmonary lesions on right side,	12	60 cases
Glandular and pulmonary lesions on left side,	8	
Glandular and pulmonary lesions on both sides,	16	
Glandular and pulmonary lesions on opposite sides,	2	
Glandular lesion without pulmonary involvement,	5	
Undetermined,	17	

Our tables show that the pulmonary lesion or lesions, either following or coincident with tuberculous lymphadenitis, occur, in the great majority of cases, upon the same side or sides as the glandular lesion.

CONDITION OF FAUCIAL AND PHARYNGEAL TONSILS IN CASES SHOWING PRESENT TUBERCULOUS LYMPHADENITIS.

Faucial tonsil enlarged,	8	(13.33%)	60 cases
Faucial tonsil not enlarged,	52	(86.67%)	
Adenoids,	1	(5%)	
Probably adenoids,	1		
Former adenoids (operation),	1		

Of the sixty cases showing glandular involvement at the time of examination in only eleven was a possible portal of infection indicated by the history.

While our table, however, shows in how many cases there was tonsillar enlargement (rendering this tissue possibly more liable to infection) at the first examination, it does not show in how many cases diseased tonsils had existed previous to the glandular involvement.

Sex.	Case Number.	Color.	Age.	Diagnosis.	Evidence of Previous Tuberculosis in Glands.	Evidence of Previous Disease Like Syphilis.*	Glands at First Examination.	Tonsils.	Adenoids.	Condition of Health During First Five Years of Life.	Probable Source of Infection.	Skin Tuberculosis.	Pulmonary Involvement.
F.	73	W.	39	Tuberculosis of lungs.	Right cervical scar.	0	N. R.	N. R.	N. R.	N. R.	Brother.	N. R.	Right upper lobe and left apex.
F.	136	W.	31	" "	Left cervical.	0	Swollen left cervical.	N. R.	N. R.	N. R.	Father.	N. R.	Right upper lobe and left apex.
M.	172	W.	49	" "	Enlarged inguinal. Left testicle removed for abscess. Sinus remains.	0	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	Right and left upper lobes, cavity on left.
M.	186	W.	17	" "	Glandular swelling in childhood.	0	N. R.	N. R.	N. R.	N. R.	Mother, brother sister.	N. R.	Right apex.
F.	336	B.	5	" "	Scar right neck.	0	N. R.	N. R.	N. R.	N. R.	Uncle.	N. R.	Impaired over right upper and middle lobes.
M.	383	W.	42	" "	Just operated on for cervical adenitis.	0	N. R.	N. R.	N. R.	N. R.	Mother.	N. R.	Right apex.
F.	424	W.	33	Tuberculosis of glands of skin, nasal discharge and eczema of upper lip.	Operations on left neck and axilla.	0	Subclavicular enlarged; discharging axillary.	N. R.	N. R.	N. R.	N. R.	Lupus vulgaris.	None.
M.	483	W.	37	Tuberculosis of lungs.	Left cervical scars.	0	N. R.	N R	N. R.	N. R.	N. R.	N. R.	Right upper and middle lobes and upper part of right lower lobe, left apex. Râles throughout rest of lungs.
M.	577	W.	46	" "	Scars on neck. Scrofula 14 yrs. old.	0	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	Both apices.
M.	623	W.	46	" "	N. R.	0	Right axillary and supraclavicular, size split pea.	N. R.	N. R.	N. R.	N. R.	N. R.	Right upper lobe with cavity.
M.	655	W.	45	" "	Scars in cervical and axillary regions.	0	Small enlarged glands.	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.
F.	836	W.	22	Tuberculosis of lungs and of skin.	N. R.	0	N. R.	N. R.	N. R.	N. R.	N. R.	Lupus of cheek.	Right apex.
F.	1010	W.	15	Tuberculosis of lungs.	Swelling of right cervical.	0	Swelling of right cervical.	N. R.	N. R.	N. R.	Friends.	N. R.	Right lung and left apex.

M.	1015	W.	25	Tuberculosis of lungs.	Had cervical adenitis in childhood.	o	Not enlarged.	N. R.	N. R.	N. R.	Sister?	N. R.	Right apex?
M.	1070	W.	23	Tuberculosis of cervical glands and of larynx.	Scars right neck.	o	Enlarged and softened cervical glands on right.	N. R.	N. R.	N. R.	N. R.	N. R.	Right apex.
M.	1142	W.	24	Tuberculosis of lungs.	Right cervical enlarged 4 yrs. ago. Right axillary enlarged 5 yrs. ago.	o	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	Both apices.
M.	1170	W.	42	Tuberculosis of lungs and hypertrophic hepatic cirrhosis.	Discharging sinus left side of neck.	o	Enlarged and soft left cervical.	N. R.	N. R.	N. R.	Mother	N. R.	Right apex, left upper lobe with cavity, left side probably primary. Same side as gland enlargement.
F.	1221	W.	21	Tuberculosis of lungs and of peritoneum.	N. R.	o	Cervicals swollen on both sides, more on left.	N. R.	N. R.	N. R.	N. R.	N. R.	Right lung, cavity. Left apex, cavity.
F.	1287	W.	24	Tuberculosis of lungs.	Scar right cervical gland removed 18 mos. ago.	o	Cervicals enlarged.	N. R.	N. R.	N. R.	N. R.	N. R.	Right upper lobe, cavity. Left upper lobe.
F.	1577	B.	27	" "	Left cervical removed one and one-half years ago.	o	N. R.	N. R.	N. R.	N. R.	N. R.	N R.	Left lung.
F.	1603	W.	26	Tuberculosis of lungs and lupus vulgaris.	N. R.	o	N. R.	N. R.	N. R.	N. R.	Sister.	Lupus vulgaris.	Right upper lobe.
F.	1642	W.	40	Tuberculosis of lungs.	Scars left cervical and old abscesses also right side.	o	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	Right upper lobe and left apex.
M.	1646	B.	19	" "	Swelling of cervicals 1 year ago.	o	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	Right apex, left upper lobe, cavity.
F.	1698	W.	34	" "	Cervicals swollen 2 years ago.	o	Cervicals slightly swollen.	N. R.	N. R.	N. R.	N. R.	N. R.	Right lung and left upper lobe.
M.	1827	W.	15	Tuberculosis of glands.	Cervical enlarged.	o	Cervical enlarged.	N. R.	N. R.	N. R.	Sister.	N. R.	None.
F.	1835	W.	29	Tuberculosis of lungs.	N. R.	o	Cervicals slightly enlarged.	N. R.	N. R.	N. R.	N. R.	N. R.	Both apices.
F.	1872	W.	47	" "	N. R.	o	Left cervical enlarged.	N. R.	N. R.	N. R.	N. R.	N. R.	Left upper lobe.
M.	1875	W.	6	" "	N. R.	o	Cervicals enlarged, especially right.	N. R.	N. R.	N. R.	Parents.	N. R.	Left apex?
M.	1941	B.	45	" "	Cervicals enlarged in childhood.	o	Marked enlargement of cervicals and supracondyloid.	N. R.	N. R.	N. R.	N. R.	N. R.	Left apex.
F.	1951	W.	19	" "	Scar on neck from tuberculous cervical glands.	o	N. R.	N. R.	N. R.	N. R.	Brother.	N. R.	Right apex.

* + signifies present, o absent, N. normal, and N. R. not recorded. In many of the not recorded cases it is evident there was no record on account of the absence of the condition.

Sex.	Case Number.	Color.	Age.	Diagnosis.	Evidence of Previous Tuberculosis in Glands.	Evidence of Previous Disease like Syphilis.*	Glands at First Examination.	Tonsils.	Adenoids.	Condition of Health During First Five Years of Life.	Probable Source of Infection.	Skin Tuberculosis.	Pulmonary Involvement.
F.	1956	B.	12	Tuberculosis of lungs and of glands.	Scars over cervical glands.	0	Post-cervicals enlarged.	N. R.	N. R.	Sickly.	House?	N. R.	Right upper lobe cavity, and left upper lobe.
F.	1984	W.	26	Tuberculosis of lungs.	N. R.	Syphilis?	N. R.	N. R.	N. R.	N. R	Fellow-worker.	Probable former lupus of face. Scars present.	Three lobes.
M.	2013	W.	30	Tuberculosis of lungs, of glands and of joints.	N. R.	0	Right axillary enlarged.	N. R.	N. R.	N. R.	Mother.	N. R.	Right and left apices. Cavity on right.
M.	2055	W.	25	Tuberculosis of lungs and of glands.	Lymphadenitis 6 mos. after scarlet fever at 14 yrs.	0	Cervicals and axillary enlarged for last 11 yrs.	N. R.	N. R.	N. R.	Father.	N. R.	Both apices.
M.	2082	W.	29	Tuberculosis of lungs.	Tuberculosis of right inguinal following tuberculous necrosis of right femur.	0	Right inguinal.	N. R.	N. R.	N. R.	House.	N. R.	Left upper lobe and right apex.
M.	2090	W.	34	" "	Tuberculous adenitis for 7 yrs.	0	Scars on right side neck.	N. R.	N. R.	N. R.	Father.	N. R.	Left lung and right apex, bone tuberculosis, right femur.
F.	2100	W.	43	" "	Scar right neck.	0	N. R.	N. R.	N. R.	N. R.	Mother?	N. R.	Both lungs, cavities at apices.
F.	2131	W.	23	Tuberculosis of lungs and of lymph glands.	Scar left neck.	0	Enlarged right side neck.	N. R.	N. R.	N. R.	Father.	N. R.	Both apices.
M.	2141	W.	10	Tuberculosis of lungs.	N. R.	0	Slightly enlarged cervicals.	N. R.	N. R.	N. R.	N. R.	N. R.	Both apices.
F.	2143	W.	14	Tuberculosis of lungs and mitral insufficiency	Cervical adenitis in infancy.	0	Cervical adenitis.	N. R.	N. R.	Scrofula.	Father.	N. R.	Both apices.
M.	2149	W.	42	Tuberculosis of lungs.	N. R.	0	Enlarged inguinals and cervicals, especially right.	N. R.	N. R.	N. R.	Step-mother.	N. R.	Both apices. Cavity on left.
M.	2180	W.	42	" "	Cervical scar 14 yrs. ago; had cervical adenitis.	0	N. R.	N. R.	N. R.	N. R.	Mother.	N. R.	Both upper lobes, cavity on right.
F.	2193	W.	18	" "	Cervical glands swollen many years.	0	Right cervical swollen.	N. R.	N. R.	N. R.	Fellow-worker.	N. R.	Both apices, especially right.

M.	2223	W.	9	Tuberculosis of lungs and of glands.	N. R.	ó	Enlarged bronchial and cervical glands.	N. R.	N. R.	N. R.	N. R.	N. R.	Right apex.
M.	2226	W.	31	Tuberculosis of lungs and of intestines.	N. R.	o	Cervicals enlarged, right posterior.	N. R.	N. R.	N. R.	Mother and brother.	N. R.	Right upper lobe and left apex.
M.	2229	W.	16	Tuberculosis of lungs.	N. R.	o	Cervical gland swollen.	N. R.	N. R.	N. R.	House.	N. R.	Both apices.
F.	2276	W.	20	" "	Scar on neck. Enlarged cervicals on left.	o	Enlarged left cervicals.	N. R.	N. R.	N. R.	N. R.	N. R.	Both lungs.
F.	2281	W.	32	" "	N. R.	o	Enlarged left cervical.	N. R.	N. R.	N. R.	N. R.	N. R.	Right upper lobe and left apex.
M.	2285	W.	45	" "	Cervicals large for 5 or 6 yrs.	o	Cervicals enlarged.	N. R.	N. R.	N. R.	N. R.	N. R.	Both upper lobes, cavities on right.
F.	2313	W.	40	" "	Had enlarged cervicals.	o	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	Both apices.
M.	2324	W.	45	Tuberculosis of lungs, pleura, glands, appendix, and intestines.	N. R.	o	Bronchial.	N. R.	N. R.	N. R.	Father and sister.	N. R.	Both apices, cavities.
M.	2329	W.	10	Tuberculosis of lungs and mitral insufficiency.	Scars on neck, cervical adenitis.	o	N. R.	N. R.	N. R.	N. R.	Father.	N. R.	Right upper lobe.
F.	2331	W.	15	Tuberculosis of lungs and of glands.	N. R.	o	Submaxillary and cervical adenitis.	N. R.	N. R.	Poorly.	Brother.	N. R.	Both apices.
M.	2363	W.	36	Tuberculosis of lungs.	Left cervical adenitis.	o	Left cervical adenitis.	N. R.	N. R.	N. R.	Mother, brother, sister.	N. R.	Right upper lobe and left apex.
M.	2366	W.	32	Tuberculosis of lungs and lupus of hand.	N. R.	o	N. R.	N. R.	N. R.	N. R.	N. R.	Lupus of hand.	Left lung, cavity inferior lobe and right apex.
M.	2371	W.	25	Tuberculosis of lungs.	Scar from cervical adenitis.	o	N. R.	N. R.	N. R.	N. R.	Sister?	N. R.	Both apices.
M.	2380	W.	17	" "	Scar from left cervical adenitis.	o	N. R.	N. R.	N. R.	N. R.	Mother.	N. R.	Both lungs.
F.	2497	W.	31	" "	Had cervical adenitis.	o	N. R.	N. R.	N. R.	N. R.	Father, mother, and house.	N. R.	Right upper lobe and left apex.
F.	2507	W.	21	Tuberculosis of lungs, enlarged thyroid, tuberculous ulceration of lip.	N. R.	o	N. R.	N. R.	N. R.	N. R.	Mother.	Ulcer on right corner of mouth and on lower lip.	Right apex.
F.	2616	W.	24	Tuberculosis of lungs.	Tuberculous glands in neck marked 7 yrs. ago.	o	N. R.	N. R.	N. R.	N. R.	House?	N. R.	Right apex.

* + signifies present, o absent, N. normal, and N. R. not recorded. In many of the not recorded cases it is evident there was no record on account of the absence of the condition.

Sex.	Case Number.	Color.	Age.	Diagnosis.	Evidence of Previous Tuberculosis in Glands.	Evidence of Previous Disease like Syphilis.*	Glands at First Examination.	Tonsils.	Adenoids.	Condition of Health During First Five Years of Life.	Probable Source of Infection.	Skin Tuberculosis.	Pulmonary Involvement.
F.	2668	W.	28	Tuberculosis of lungs, glands, larynx, and pharyngeal tonsil.	Left cervicals enlarged.	0	Tuberculous enlarged glands of both sides of neck.	Pharyngeal swollen and ulcerated.	N. R.	N. R.	N. R.	N. R.	Right upper lobe and left apex.
M.	2684	W.	31	Tuberculosis of lungs.	Scars on right and left sides of neck.	0	N. R.	N. R.	N. R.	N. R.	N. R.	N. R.	Right lower lobe.
M.	2732	W.	15	Tertiary syphilitic pharyngitis.	Scars from tuberculous glands.	Syphilis.	N. R.	Tonsils enlarged.	N. R.	Sickly.	N. R.	N. R.	None.
M.	2750	W.	20	Tuberculosis of lungs.	Scars over cervical glands.	0	Right cervicals enlarged.	N. R.	N. R.	N. R.	Father.	N. R.	Left upper lobe, right apex.
M.	2783	W.	37	" "	Cervicals enlarged 9 yrs. ago.	Syphilis 3 yrs. ago.	N. R.	N. R.	N. R.	N. R.	Brother.	N. R.	Right upper and part lower lobe. Cavity in right upper. Left upper lobe.
F.	2801	B.	21	Tuberculosis of lungs and of cervical glands.	N. R.	0	Left cervicals tuberculous.	Enlarged.	N. R.	N. R.	N. R.	N. R.	Right apex.
M.	2811	W.	25	Tuberculosis of lungs.	Left cervical gland removed 2½ yrs. ago.	0	N. R.	N. R.	N. R.	N R.	N. R.	N. R.	Right apex.
M.	2817	W.	1½	Tuberculosis of lungs and of glands.	Enlarged cervicals.	0	Cervicals enlarged.	N. R.	N. R.	N. R.	N. R.	N. R.	Left lung and right apex.
M	2835	W	16	Asthma and emphysema.	Glands removed from neck.	0	N. R.	N. R.	N. R.	Sickly.	N. R.	N. R.	Emphysema.
M.	2885	W.	11	Tuberculosis of lungs.	Tuberculous glands.	0	N. R.	N. R.	N. R.	Sickly.	Father.	N. R.	Right upper lobe.
F.	2891	W.	38	" "	Scar left side neck, tuberculous glands.	0	N. R.	N. R.	N. R.	N. R.	Brother and sister.	N. R.	Left upper lobe.
F.	2907	W.	8	" "	Scars on neck, tuberculous glands.	0	N. R.	N. R.	N. R.	Sickly.	Father.	N. R.	Right apex.
F.	2910	W.	37	" "	N. R.	0	Enlarged cervicals, axillary and epitrochlear.	N. R.	N. R.	N. R.	Brother.	N. R.	Right apex.
M.	2949	W.	13	" "	Scar from gland in neck.	0	N. R.	N. R.	Had removed.	N. R.	N. R.	N. R.	Right apex.
F.	3084	W.	15	" "	Scar on neck over posterior lymphatics.	0	Cervicals enlarged both sides.	N. R.	N. R.	N. R.	N. R.	N. R.	Right apex.
F.	3186	W.	23	" "	Scar on right neck due to old "abscess."	0	Some enlargement on right.	Slight enlargement.	N. R.	Good.	N. R.	N. R.	Right upper lobe, cavity.

M.	3224	W.	43	Tuberculosis of lungs.	Abscess left neck when eight years old.	o	Hard.	N. R.	N. R.	Good.	Friends.	N. R.	Right lung cavity, left upper lobe.
M.	3347	W.	30	" "	Enlarged gland under left ear 8 yrs. ago.	o	N.	N. R.	N. R.	Good.	Shop.	N. R.	Left upper lobe cavity, right upper lobe.
M.	3393	W.	22	" "	Scars left neck due to broken-down glands.	o	N. R.	N. R.	N. R.	Weakly.	Father, sister?	N. R.	Left lung, right apex.
F.	3432	W.	20	" "	N. R.	o	Cervicals markedly enlarged, at autopsy tuberculous.	N. R.	N. R.	N. R.	Mother.	N. R.	Right lung cavity, left apex.
M.	3509	W	36	" "	Old scar on right.	o	Some induration.	N. R.	N. R.	Good.	Father?	N. R.	Right upper lobe; left lung. Left pneumothorax.
F.	3528	W.	40	Tuberculosis of lungs and of glands.	N. R.	o	Cervicals and axillary enlarged.	N. R.	N. R.	N. R.	Husband, brother, sister.	N. R.	Right upper lobe cavity; left apex.
M.	3545	W.	35	Tuberculosis of lungs.	Abscess, tuberculous? right cervical 15 yrs. of age.	o	N.	N.	N. R.	Good.	Sister.	N. R.	Right upper lobe and left upper lobe, cavity
M.	3584	W.	29	" "	Enlarged cervical 3 yrs. ago.	o	N. R.	N.	N. R.	"	Friend.	N. R.	Right upper lobe, cavity
F.	3762	W.	33	" "	Scars right cervical unknown origin.	o	Cervicals slightly enlarged.	N.	N. R.	"	?	N. R.	Right apex.
M.	3772	W.	12	Tuberculosis of glands.	N. R.	o	Cervical, axillary, inguinal enlargement.	Enlarged.	Probably.	"	N. R.	N. R.	None.
M.	3800	W.	18	Tuberculosis of lungs and of cervical glands.	N. R.	o	Cervicals enlarged on right.	N. R.	N. R.	"	N. R.	N. R.	Right apex.
M.	3848	W.	20	Tuberculosis of lungs.	Scar left cervical.	o	Right cervical large and soft.	Enlarged.	N. R	"	Father.	N. R.	Right upper lobe cavity, left apex, cavity?
M.	3871	W.	30	Tuberculosis of lungs and of glands, adhesive pleurisy and adhesive pericarditis.	N. R.	o	Cervicals enlarged.	Enlarged and reddened.	N. R.	"	N. R.	N. R.	Both lungs, cavity on right.
M.	3994	W.	45	Tuberculosis of lungs.	Suppurating gland removed from right cervical region years ago.	o	N.	N.	N. R.	Good.	Wife.	N. R.	Right upper lobe cavity; left apex.
F.	4008	W.	11	Tuberculosis of glands.	N. R.	o	Cervicals, axillaries, inguinals enlarged.	N.	N. R.	"	Mother.	N. R.	None.
F.	4075	W.	19	Tuberculosis of lungs and of cervical glands.	N. R.	o	Post. cervicals enlarged.	N.	N. R.	Weakly.	Brother and father?	N. R.	Right upper lobe and left lung, cavity.
F.	4311	W.	25	Tuberculosis of lungs and of cervical glands.	Cervical adenitis at 12 yrs. operated.	o	Left cervicals enlarged.	Inflamed.	N. R.	Delicate.	Brother-in-law.	N. R.	Left apex.

* + signifies present, o absent, N. normal, and N. R. not recorded. In many of the not recorded cases it is evident there was no record on account of the absence of the condition.

Sex.	Case Number.	Color.	Age.	Diagnosis.	Evidence of Previous Tuberculosis in Glands.	Evidence of Previous Disease like Syphilis.*	Glands at First Examination.	Tonsils.	Adenoids.	Condition of Health During First Five Years of Life.	Probable Source of Infection.	Skin Tuberculosis.	Pulmonary Involvement.
M.	4403	B.	18	Tuberculosis of lungs, of glands and of joints.	Scars in cervical regions.	o	All, except cervicals which were removed, enlarged.	N. R.	N. R.	Good.	N. R.	N. R.	Both lower lobes.
M.	4431	B.	11	Tuberculosis of lungs and of glands (operation).	Scars in cervical regions.	o	Axillaries large and tender.	Enlarged.	N. R	"	N. R.	N. R.	Right upper lobe.
F.	4461	W.	14	Tuberculosis of skin and bone.	N. R.	o	N.	N.	N. R.	"	N. R	Scars on rt. shoulder following operation on arm.	None.
M.	4485	W.	33	Tuberculosis of lungs and of glands.	Scar in left axilla due to old suppurating gland.	o	Glands swollen about left elbow	N	N. R.	Weakly.	N. R.	N. R.	Both upper lobes, middle and part of right lower.
M.	4553	B	24	Tuberculosis of lungs and of cervical glands (operation).	Scars in cervical regions.	o	Few left cervicals slightly enlarged.	N.	N. R.	"	Friend.	N. R.	Left lung.
F.	4603	B.	11	Tuberculosis of glands and of hip.	N. R	o	Enlargement of all lymphatics.	Slight hypertrophy.	+	Good.	Mother.	N. R.	None.
M.	4606	W.	23	Tuberculosis of lungs.	Scars from cervical abscesses.	o	Scars.	N.	N. R.	Poorly.	Father.	N. R.	Both upper lobes.
F.	4667	W.	31	" "	Scar left cervical from tuberculous adenitis.	o	Cervicals enlarged.	N.	N. R	Delicate.	Mother.	N. R.	Right apex left lung, cavity.
M.	4723	B.	10	Tuberculosis of lungs, of glands and chorea.	N. R.	o	General glandular enlargement.	N.	N. R.	Good.	Sister.	N. R.	Right apex.
M.	4735	W.	19	Tuberculosis of lungs and pyo-pneumothorax.	Scar right cervical abscess 12 yrs. old.	o	Glands slightly enlarged.	Slightly red.	N. R.	Good.	N. R.	N R	Right and left upper lobes.
F.	4778	W.	7	Tuberculosis of lungs and of cervical glands.	N. R.	o	Post. cervicals large and hard.	Swollen.	N.	Poorly.	N. R	N. R.	Both lungs scattered tubercles.

*+ signifies present, o absent, N. normal, and N. R. not recorded. In many of the not recorded cases it is evident there was no record on account of the absence of the condition.

TUBERCULOSIS OF THE SKIN.

Lupus vulgaris,	4	Out of 4840 cases
Probable former lupus vulgaris,	1	
Tuberculosis cutis orificialis,	1	
Scarring of former cutaneous tuberculosis following bone tuberculosis,	1	

With regard to tuberculosis of the skin, one is impressed, in the study of our records, with the great infrequency with which this condition is recorded.

In the four thousand eight hundred and forty cases examined in the dispensaries and wards of the Institute during the four years, cutaneous tuberculosis has been seen in only five cases, with a possible history of it in two other cases.

Of these few cases, the majority were of the most common form, namely, lupus vulgaris. Of the four cases of lupus vulgaris, three had also a pulmonary involvement, while the fourth had glandular tuberculosis, but no pulmonary involvement.

The probable explanation of the scarcity of cases of glandular and cutaneous tuberculosis among the patients examined at the Institute is that, in the mind of the laity, tuberculosis always suggests disease of the lungs, and for this reason only those patients who have or who suspect that they have pulmonary involvement come to the Institute, while those having glandular or cutaneous tuberculosis go for treatment to the surgical or skin disease dispensaries of the general hospitals. It is nevertheless strange that so few of our cases show evidences or give a history of previous tuberculosis of these structures.

J. DOUGLAS BLACKWOOD.

NEUROLOGICAL WORK.

The neurological work for the year 1906 embraces:

(A) A study of the gross and microscopic lesions of the central and peripheral nervous system of sixty-four cases.

(B) A study of the clinical manifestations of thirty-five cases.

ACUTE LEPTOMENINGITIS.

Number of brains examined,.....64
Acute leptomeningitis,..... 3

Of the three cases of tuberculous meningitis, Nos. 2861, 3052, and 4023, two are of more than ordinary interest. One, No. 2861, belongs to the proliferative type of meningitis considered in the Third Annual Report. The meningeal changes were localized to the base of the frontal lobe. The pathological examination is as follows:

Case No. 2861. Gross examination: Slight atrophy; convolutions of the left side markedly swollen; marked unilateral edema; very slight passive congestion on right side and marked capillary venous congestion on left; no basal roughening; marked arteriosclerosis of circle of Willis. Microscopic examination: Diffuse chromatolysis of a few ganglion cells scattered here and there throughout anterior horns of spinal cord, though the majority of the cells normal; in one of the sections an area of rarefaction of the neuroglia surrounding the anterior horn cells; very marked congestion of the medulla; diffuse chromatolysis of the cells throughout the medulla; in sections taken from the inferior portion of the frontal lobe proliferating type of meningitis extending over both sides of brain; irregular nests of ependymal cells beneath the surface of the aqueduct of Sylvius; subependymal gliosis; very marked peripheral congestion of cortex.

Case No. 3052 is a plastic productive type of meningitis of the usual type, associated with an area of hemorrhagic meningo-encephalitis, the pathological examination being as follows:

Gross examination: Cortical convolutions swollen; an area of hemorrhagic softening 3 by 10 mm. at the base of the left frontal lobe; cerebral arteries studded with minute tubercles; an especially thick exudate over the superior surface of the cerebellum of the left side; marked passive congestion over the base around the optic commissure; an exudate at least one-fourth of an inch thick surrounding the optic tract and peduncle of the pituitary body, which extends posteriorly to the corpora mammillaria and over the superior surface of the frontal lobe; a thick plastic exudate in the intergyral spaces; an accumulation of small, nodular, yellowish-white tubercles on the convexity, most marked in the Sylvian fissure, and most intense in the district of the middle cerebral artery. These tubercles are most frequent along the course of the veins, and some of them lie directly over the veins; on the right side a few tubercles scattered along the Sylvian fissure and in the gyri immediately above it. The ventricular fluid is turbid and the ependyma is studded with millions of small granular tubercles. This is confined mainly to the anterior horn. The posterior horn appears to be thickened, but not granular. The velum interpositum is studded over with large numbers of small tubercles in the choroid plexus.

Case No. 4023 is of considerable interest from both a clinical and pathological standpoint. The patient was a male aged fifty and was superintendent of a life insurance company. There was no history of infection. He probably had tuberculosis for fifteen years. He complained some of cough at night, had very profuse expectoration, persistent dyspnea, and shortly before death, night-sweats. He was five feet five and a half inches tall and weighed one hundred and eighteen pounds. His highest weight was one hundred and sixty-one and a half, his usual weight one hundred and fifty-five pounds.

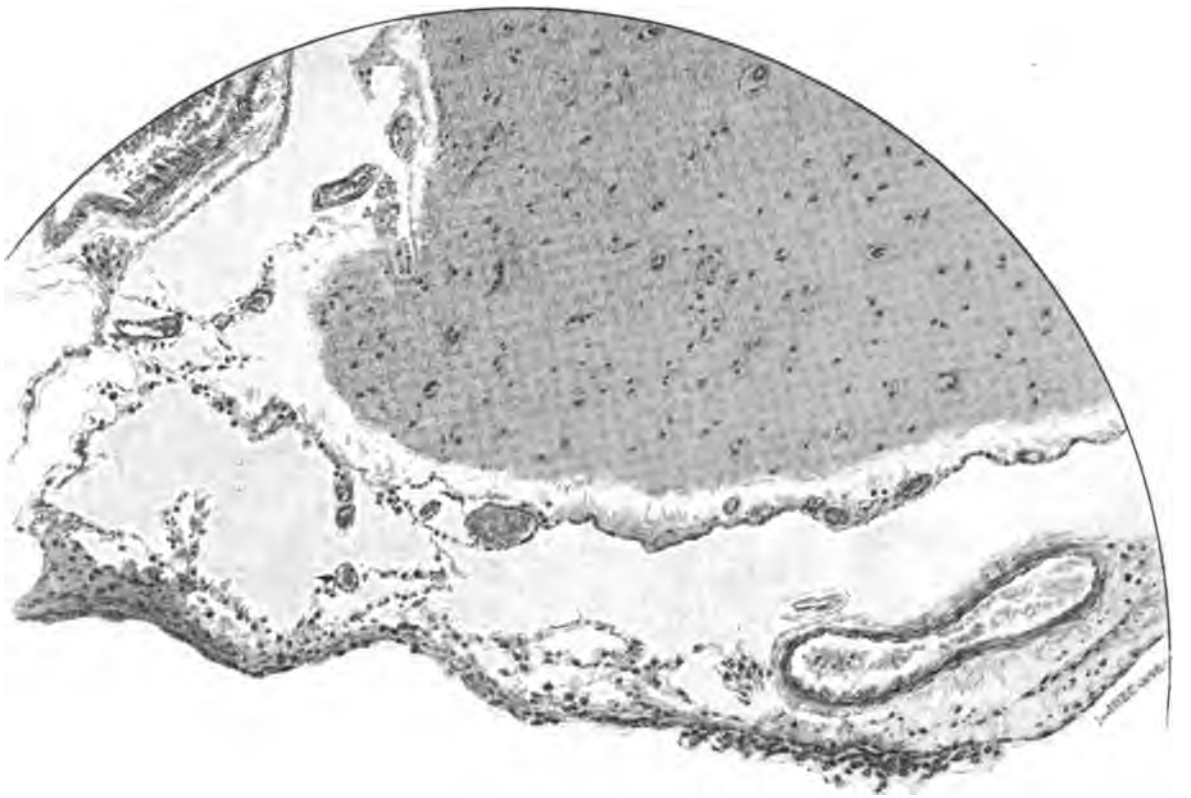
Physical examination: The right upper lobe showed infiltration and a large cavity. There were scattered tubercles throughout the rest of the right lung. There was involvement of the left upper lobe with a small cavity at the apex. The pathological and clinical findings corresponded. There were tubercles in the intestines but none in the liver. The kidneys showed parenchymatous nephritis.

Nervous examination: There was no history of nervous disease in the family. Patient went to school in London until sixteen years of age. There was no change in disposition. Patient was hopeful, depressed at times, but was not suspicious. There was failure of memory, but no delusions. Co-

ordination was good. The muscular power in both upper and lower extremities was fair, grip was fair. Biceps jerk was quick, knee jerk was quick. There was extension of the big toe to plantar irritation on the right side, and the Gordon reflex was present. The ulnar reflex was present. The pupils were unequal, the left middle-wide and almost twice as large as the right. Both contracted to light and convergence. There was a slight tremor of the hands. The vasomotor tone was poor. The von Graefe sign was present on both sides, and there was no retraction of the eyelids. Two days before death tremor of the right leg and foot, and of the right arm, resembling paralysis agitans, was present. There was no tremor of the left side. The expression resembled somewhat that seen in paralysis agitans. Patient had terminal delirium.

Gross examination: No atrophy of the cortical convolutions; slight chronic leptomeningitis; along the course of the veins white minute granules that look as if they might be organized tubercles; a slight plastic exudate in the superior longitudinal fissure; throughout the entire mesial surface of both hemispheres of the brain, organized white fibrous masses, pin-point in size, of hard consistence and having the appearance of organized tubercles. There are no such granules in the fissure of Sylvius; a few white granules of the same character here and there on the convexity of the brain; over the frontal area the gyri have a tumefied appearance due to this roughening; slight edema, marked passive congestion and marked basal roughening. This last appears to be composed of minute white granules; moderate arteriosclerosis of the circle of Willis; marked internal hydrocephalus; both choroids very cystic. The left choroid shows several yellow caseating tubercles, the right choroid a large number of small white fibrinous nodules (especially on the mesial inferior surface). The ependyma is smooth and thickened. The spinal cord is negative. There are no well-developed meningeal tubercles other than those above noted.

Microscopic examination: The areas over the base of the frontal lobe are caused by a localized thickening or induration of the pia. Under the microscope it is a diffuse process composed for the most part of thickly placed fibrils, but differing from chronic leptomeningitis in that it is particularly rich in cell nuclei. The nuclei are small and circular with relatively little chromatin. A few large, pale nuclei are present. The surface is roughened, due to the irregular massing of the cells and closely placed fibrils. There is no evidence of active arterial congestion or other evidence of a recent acute inflammatory process. The cortex is rarefied in the outer layers. There is marked passive congestion in the medulla. The hematoxylin-eosin method confirms the above observations.



Case 4023. Productive type of leptomeningitis with localized tubercle formation on arachnoid. Note absence of congestion. Note also spindle type of cell throughout entire pathological process.

The small tubercles on the mesial surface of the brain are composed of an accumulation of round epithelioid cells in which there is a small nucleus with a relatively large amount of protoplasm. There is practically no other change, except the general thickening of the pia-arachnoid above referred to. Morphologically the above-mentioned cells appear to be of a developing type and inconsistent with retrogressive changes. There are no areas of increased blood-supply and no other evidence of inflammation in the neighboring meninges.

I was at first inclined to look upon this as a healing or healed process, on account of the absence of inflammatory reaction. This type of cell formation does not correspond, however, to that seen in healing or healed processes. However, we must take into consideration that these cells are due to proliferation of the endothelioid cells in the pia-arachnoid. The lack of evidence of an inflammatory reaction speaks against considering the process here described as a meningitis. It corresponds more to the cases of secondary carcinoma of the meninges without inflammatory reaction. In these cases of secondary miliary metastases the meninges are studded with fine pin-point nodules, and when these occur without inflammatory reaction the condition is spoken of as carcinomatosis of the meninges, and when there is a distinct inflammatory reaction it is designated by the term carcinomatous meningitis. It is a question, however, whether we are justified in distinguishing between miliary tubercles of the meninges without meningitis and with meningitis. I am rather inclined to the opinion that the case here reported represented a healing process, or a process which while still active, was in all probability associated with a preceding low-grade inflammation which had subsided before the death of the patient. It does not correspond in any way with the condition called *tuberculosis en plaque*, which is a chronic, proliferating, fibroid type of tuberculosis, with extensive areas involving the meninges of the cortex. The caseating tubercles of the choroid plexus would indicate that the brain involvement had been of some duration.

This case is also of considerable interest from a clinical standpoint. There was no evidence of active meningitis. The patient had not complained of headache, there was no retraction of the neck, no convulsions and no disturbance of consciousness up until a short period before death, and then only in the nature of a terminal delirium. The symptoms indicative of a central nervous involvement were the Babinski and Gordon reflexes, the inequality of the pupils and tremor of the right side of the body. The occurrence of the Babinski reflex in tuberculosis has been considered in the First and Second Annual Reports. This symptom is of so much value in the diagnosis of diseases of the central nervous system that it becomes a matter of considerable importance when it is noted as occurring in infectious processes, and hence when it occurs a careful examination of the central nervous system should be made in order to determine the presence or absence of diseased conditions. The minute granules here described and the absence of an inflammatory reaction could very easily be overlooked and the case recorded as one in which the Babinski reflex was present without organic disease. This is not meant to imply that the Babinski reflex does not rarely occur in cases when a very careful examination reveals no evidence of organic disease, since it is admitted in cases of uremia and following epileptic attacks.

The report of this case reveals how little evidence may be present on which to make a diagnosis of tuberculosis of the brain. In recent examinations of brains of tuberculous patients, small, white, fibrous nodules have been not infrequently seen along the course of the blood-vessels, and more particularly the veins. A microscopic examination of these nodules shows them to be a localized fibrosis surrounding the veins. There is no evidence that they are of a tuberculous nature, but simply represent a proliferation of the fibroid connective tissue around the veins with an area of thickening of the under surface of the pia.

SUBACUTE LEPTOMENINGITIS.

(Roughening of the base of the brain.)

Number of brains examined,	64	
Slight grade of roughening,	12	64
Moderate grade of roughening,	3	
Marked grade of roughening,	13	
No roughening,	36	

A very careful study of this subject as presented in the First and Second Annual Reports corroborates the tentative conclusions there presented. This condition is limited practically in every case to the base of the brain, and more particularly to the base of the frontal lobes. It is evidently the result of an irritative material either in the circulating blood or in the lymph at the base of the brain. The limitation of the process to the base of the frontal lobes practically excludes the former. In some cases the process is fairly extensive over the base of the temporosphenoidal lobes. The presence of this low-grade irritative process has, I think, an important bearing upon the localization of certain types of meningitis. The low-grade plastic type of tuberculous meningitis with marked thickening at the base of the brain may be considered when it is a minor grade, as an accentuation of the more marked cases of subacute leptomeningitis. The areas of marked roughening over the base may, on the other hand, be considered as areas of decreased resistance for the localization of a bacterial infection which may be due to either the tubercle bacillus or other infecting organism. The plastic puriform type of tuberculous meningitis may show the presence of both tubercle bacilli and other bacteria. Streptococci are the most frequent micro-organisms of mixed infection here noted. Inasmuch as the subacute fibrinous change is only noted in the advanced cases, this is probably due to some change associated with a mixed infection process. The clinical picture presented by some cases of this plastic type of meningitis reveals no clinical evidence of extensive involvement of the meninges. In a case recently under observation, the only localization was a

slight involvement of the third nerve of the right side. Persistent headaches were present, but no other symptom of marked intracranial pressure. The determination of the occurrence of this type may be due to a septic process elsewhere than in the lungs. A septicemia from joint or uterine trouble in a patient suffering from pulmonary tuberculosis may be complicated by a mixed type of tuberculous, septic meningitis. Sections from such a case will show the presence of both septic organisms and tubercle bacilli.

The areas of chronic tuberculous meningo-encephalitis described in the Second Annual Report (p. 101) occur most frequently at the base of the frontal lobe. This localized chronic type of meningeal and cortical trouble may be due to a lowered resistance of the meninges at the base of the brain; in other words, there is a series of meningeal changes, beginning with a low-grade irritative process, manifested by basal roughening and fibrinous exudate, proliferation of the endothelial cells and fixed connective-tissue cells, which may show as a complication a very low grade of proliferative meningitis, an acute plastic type of tuberculous meningitis, or a chronic tuberculous meningo-encephalitis.

CHRONIC LEPTOMENINGITIS.

Number of brains examined,.....64
Chronic leptomeningitis,..... 5

Two of the five cases of leptomeningitis were of a moderate grade and associated with extensive edema. These cases belong to the group described in the Third Annual Report, in which there was some evidence in favor of the leptomeningitis being the result of a marked edematous process. The other three cases presented the usual type of chronic leptomeningitis. In one of the cases the leptomeningitis was most intense over the motor area.

CHRONIC TUBERCULOUS MENINGO-ENCEPHALITIS.

Number of brains examined,.....64
Chronic tuberculous meningo-encephalitis,..... 3

In the Second Annual Report a pathological condition of the cerebral cortex, not previously described in the literature, was recorded. This condition was present in four cases of the one hundred and ten examined. It is interesting to note that of the fifty-two brains recorded in the First Annual Report, and of the thirty-two brains studied for the Third Annual Report, no evidence of this peculiar pathological condition was found. Out of the sixty-four brains studied for this report, this condition of yellow softening, independent of arterial disease, was found three times. It was present in cases Nos. 4287, 4232, and 3393. In one of these cases there was evidence of moderate to advanced arteriosclerosis. The causal factors in the production of this pathological condition were extensively discussed in the Second Annual Report, and it will, therefore, not be necessary to discuss them further than to state that the condition may be due to a local tuberculosis of the meninges. In some cases small tubercles are found in the meninges over the area of softening. Whether these are to be considered the causative factor in the production of the softening, or whether the localization of the tubercles in this area is due to a lowered resistance to infection, has not been determined. Inasmuch, however, as this peculiar pathological condition has not been recorded in brains other than those of advanced tuberculous patients, we may safely assume that the condition bears a close relation to the tuberculous process. The pathological process in these areas of softening begins with an area of rarefaction and an extravasation of free red blood-cells into the cortical tissue. This is associated with a chromatolysis and disappearance of the ganglion cells and with a secondary proliferation of the neuroglia tissue. The ganglion cells in the neighborhood of the area of softening may show the presence of iron infiltration. One of the cases here reported, No. 4232, was associated with calcification of the meninges in the neighborhood of the area of softening.

In case No. 3393 there were areas of this process as follows: At the base of the right frontal lobe there was one area 3 cm. by 2 mm., and at the base of

the left frontal lobe a small area 5 mm. by 3 mm. There was an area 2 cm. by 3 cm. over the second occipital gyrus of the left side, a small area 2 by 3 mm. at the tip of the right temporosphenoidal lobe, and an area 4 mm. by 6 mm. at the middle of the second temporosphenoidal gyrus of the right side.

Case No. 4287 showed two small areas of yellow softening on the superior parietal lobe of the right side. In this case there was also very extensive perivascular hemorrhage around the aqueduct of Sylvius and subacute proliferative thickening of the pia-arachnoid over the base of the frontal lobe.

It is of some interest to note that in these cases there was a marked endarteritis in the vessels of the choroid plexus, yet no endarteritis was found in the circle of Willis and in the branches of the Sylvian artery, even on a careful examination.

Case No. 4232. There were three areas of hemorrhagic softening; one, 1 cm. by 8 mm. in size, situated at the extreme anterior portion of the inferior surface of the left frontal lobe; one, 4 mm. by 2 mm., immediately posterior to this; and a larger one, 1 cm. by 3 mm., at the inferior surface of the right frontal lobe. Microscopic examination of these sections showed some calcification of the meninges. Moreover, these sections differed considerably from other sections previously described. The meninges in the neighborhood of the area of softening contained large numbers of round, irregular, nucleated, fibrous tissue cells, which produced a distinct thickening. At the point of the area of softening was a depression filled with an amorphous calcified material; beneath this an area of marked sclerosis; and beneath this an area with large, spider-like neuroglia cells. This last area was richly supplied with arterial capillaries and endothelial cells, all of which showed a distinct proliferation in two or three layers of cells. All these changes appear to indicate that the process in this area was of long standing. In this case tuberculosis was present in the choroid plexus, which was also cystic.

Considering the localization of the three cases here presented and the four cases presented in the Second Annual Report, it can be seen that the base of the brain is most frequently affected, and more particularly the base of the frontal lobes. It is also in this area that the chronic irritative change described under the heading "subacute leptomeningitis" is practically always met with. The

chronic irritative and productive changes in the meninges in this area would appear to be a determining factor in the production of the areas of yellow softening.

ATROPHY OF CORTEX.

Number of brains examined,	64
Slight atrophy,	13
Moderate atrophy,	5
Marked atrophy,	10

The question of atrophy of the cortex was considered in full in the Third Annual Report. Nothing of importance has been added since that time. The statistics here recorded are simply cumulative. The atrophy occurs approximately in the same percentage of cases as previously reported. The motor area and other portions of the brain and cortex have been carefully sectioned and studied in order to determine to what extent they are subject to atrophic processes. In some cases the basal ganglia show evidence of this process in the dilatation of the perivascular and pericellular spaces. The pons and medulla in some cases appear to be much smaller than the average. Without, however, a large number of controlled measurements, it is impossible to determine to what degree or in what number of cases this occurs. The distention of the pericellular spaces leads to the diapedesis of red blood-cells into this area, noted in a number of cases. It should be remembered, however, that the dilatation of the perivascular and pericellular spaces is not an uncommon condition in brains that are not atrophied. It is, however, more or less constant in atrophic processes and is to be considered as one of the essential factors in such processes. The atrophy of the cortex is mentioned in these statistics because it may be taken as an index of the degree of wasting. The determination of a relatively slight to moderate degree of atrophy is not at all difficult. In marked cases of atrophy the contrast to the normal brain is apparent to even an untrained eye. Microscopic sections have been made in all cases in order to control the condition recorded in the gross examinations.

EDEMA.

Number of brains examined,	64	
Slight edema,	17	64
Moderate edema,	9	
Marked edema,	15	
No edema,	20	
No record as to edema,	3	

A study was made during the past year of the pathological changes in the meninges, in which edema was present. It is, as a rule, difficult to determine whether chronic proliferative changes in the pia-arachnoid in cases of edema are due to the associated edematous conditions, or whether both of these are due to the same cause, or whether the chronic leptomeningeal change and the edema are accidental associations. The chronic meningeal changes here recorded are not of such a degree as to be designated as chronic leptomeningitis, but are of a minor grade, and consist for the most part of a simple thickening of the fibrous connective-tissue layers and a relative increase of the arachnoidal stroma. The changes are of a relatively minor grade, and unless a comparison is made with normal meninges, they could be very easily overlooked.

INTERNAL HYDROCEPHALUS.

Number of brains examined,	64	
Slight internal hydrocephalus,	25	64
Moderate to marked internal hydrocephalus,	14	
Marked internal hydrocephalus,	7	
No internal hydrocephalus,	18	

The condition of internal hydrocephalus is here noted as in the First, Second, and Third Annual Reports, and refers to the condition of *hydrocephalus e vacuo*. The relative divisions of slight, moderate, and marked are arbitrary, based upon the gross appearance of the ventricles at autopsy. The condition may be looked upon as a part of the general atrophy above noted. There is a possibility, however, that we are here dealing with a condition somewhat analogous to the internal hydrocephalus of Quincke,

in a much more chronic form. Quincke described a condition of internal hydrocephalus which he considered to be due to a constant leaking out of serum into the ventricular cavities analogous to the acute angioneurotic edema of other tissues. Other investigators, finding inflammatory changes of the ependyma, used the term "meningitis serosa" to describe the same. While the distention of the ventricles met with in pulmonary tuberculosis is unquestionably due in some cases to the wasting of cerebral tissue, the advanced grades may depend upon certain changes both in the choroid plexus and in the ependyma. This theory is to a certain extent supported by the pathological changes in the ependymal tissues.

EPENDYMAL CHANGES.

The ependyma was carefully studied in every case, and what may be reported as changes in the ependymal cells and changes in the subependymal tissues were found. The changes in the ependyma consist of a simple denudation of cells and proliferation of the ependymal layer, and a combination of proliferation of ependymal cells and subependymal glia. The absence of ependymal cells as a pathological process is to be looked upon with suspicion. The ependymal layer itself is so delicate that it may be destroyed in the technique of sectioning. The absence in some cases (where the greatest care was used) of the ependymal cells in some areas, while in other areas the ependymal layer was intact, but composed of cells having a largely vesicular appearance, leaves no doubt as to the pathological nature of the process. In some cases, No. 4272, for example, an exudate composed for the most part of granular débris, red blood-cells, large and small nucleated cells with neuroglia cells of an ependymal type, were present in the ventricles. In these cases the denudation of the ependyma was present. It would appear, therefore, that this polymorphous exudate in the ventricles was dependent for its existence upon the pathological changes in the

ependymal layer. There were no polymorphous or polynuclear leucocytes in the exudate. There was a distinct subependymal sclerosis in this case.

In case No. 2019 the microscopic examination showed punctate hemorrhages immediately beneath the ependymal layer and marked proliferation of the ependymal cells. There was perivascular ecchymosis in the subependymal tissues with marked subependymal congestion. There were areas having the appearance of localized inflammation of the ependyma and marked capillary infiltration. The changes found in this case were very similar to those found in cases of meningitis serosa. Proliferation of the ependymal layer, with evidence of subependymal inflammation, resembles very closely the changes found after an injection of irritating substance, such as tuberculin, carbolic acid, urine, etc., in the ventricles of experimental animals. It would appear that these changes represent pathological conditions induced by a primary distention of the ventricles, and this in turn leads to an accentuation of the same process. In the minor grades of distention of the ventricles these changes were not present. Exudate was present in the ventricles in seven cases. The ependyma was recorded as normal in thirty cases, and subependymal sclerosis, in all probability due to some irritating substance in the ventricular fluid, was present in ten cases.

CHOROID PLEXUS.

Number of brains examined,	64	
Choroid normal,	31	
Choroid tuberculous,	3	
Choroid cystic,	15	64
Choroid sclerotic,	9	
No record as to choroid,	6	

The tuberculosis in the choroid plexus of one of these cases was a part of a general miliary tuberculosis. The cystic condition of the choroids was only of moderate grade in all of the cases re-

corded. Sclerosis of the choroids includes all cases, even minor grades of thickening.

PINEAL GLAND.

A study of the pineal gland must necessarily leave one in doubt as to what constitutes a distinct pathological condition. The deposit of calcareous material, so-called brain sand, has been looked upon as a normal condition. It was only exceptionally present in the brains here reported. The pineal gland varies greatly in size and structure. Usually the acinus arrangement is not at all distinct, and when, under the microscope, this arrangement is seen clearly cut, I am inclined to look upon the condition as one due to an overgrowth of connective tissue between the acini. The most frequent pathological condition present in the pineal gland is the presence of scar tissue. This appears to be secondary to small hemorrhages. In some cases it was associated with the presence of recent hemorrhage. This is particularly true in case No. 3953, in which there was present a cystic condition, and in case No. 4141. The next most frequent condition in the pineal gland is a cystic condition. Distinct small cysts containing a gelatinous material were present in four cases. Smaller cysts containing a colloid material are much more frequent. This colloid matter has the appearance of that seen in the thyroid. A similar colloid-like material is not infrequently seen in the pituitary body. The pineal gland varies greatly in size, and there is a wide variation as to what might be considered normal. The usual size of the pineal gland is about that of a pea, and when the size has been reduced to that of a BB. shot, we consider it to be smaller than normal. In five cases the pineal gland was reported to be smaller than normal, and in five other cases it was much larger than normal. In one case, which occurred in the first year's work, the pineal gland reached such a size as to be considered a distinct tumor formation. Microscopic examination showed adenocarcinoma. Some of the more interesting of these pathological cases were as follows:

Case No. 3953. The pineal gland was twice normal size. Sections through the gland showed it to be cystic with three cysts filled with a transparent colloid material. The anterior cyst was completely surrounded by a yellow area 1 to 3 mm. in width. Microscopic examination of the sclerotic area showed the cells closely placed, with an appearance of white fibrous tissue where they were densest. Round, reticular areas about 5 or 6 mm. within smaller areas were found here and there throughout. The hyaline like material was composed of a very delicate reticulum with here and there a cell deeply staining with hematoxylin. These cells were round or irregular with eccentric nuclei. Around these cells there was a clear area, which would appear to indicate that they were engaged in a resorption process. Here and there were what appeared to be isolated nuclei with a fine chromatin reticulum. This may possibly be a tuberculous sclerosis. The blood-supply was much better than normal. There were no giant cells.

Case No. 4141. The pineal gland in this case had the appearance as if it contained a collapsed cyst, which on section proved to be true. Under the microscope there was evidence of a hemorrhagic cyst surrounded by considerable scar tissue. A peculiar formation was present in the center of the cyst having the appearance of an endothelioma, but which was probably a spur of pineal gland tissue.

Case No. 4306. The pineal gland in this case was larger than normal. Under the microscope the acinus arrangement was very distinct and the fibroid scar very large. There was considerable interstitial tissue scattered throughout the gland. Here and there was an isolated area of epithelial cells encapsulated within dense fibrous tissue. This type of cell appears to be the same as that of the rest of the gland.

In one of the cases noted, No. 3941, the pineal gland was covered by a calcified material. In another case, No. 3887, it was adherent to the walls of the straight sinus. There was also evidence in the velum interpositum of an old inflammatory process.

CLINICAL MANIFESTATIONS.

A record of the clinical manifestations was made in thirty-five cases. These were all hospital cases.

HISTORY OF NERVOUS DISEASE IN THE FAMILY.

A history of nervous disease in the family was recorded in four cases. A study of nervous disease in the immediate ancestry gave the following results.

Case No. 3635, the mother's cousin was epileptic.

Case No. 4010, aunt of the patient had nervous prostration.

Case No. 4075, mother was nervous, two sisters died of paralytic phenomena.

Case No. 4382, mother was epileptic.

A history of nervous diseases in the family would have considerable value if it could be obtained with any degree of accuracy. It is a common experience to find that patients only give a history of nervous or mental disease after considerable questioning and with much reluctance. A low nervous tone, such as is frequently transmitted to the offspring from parents who suffer with the graver neuroses, epilepsy, hysteria, neurasthenia, etc., has a tendency to induce visceral disturbances. Nervous dyspepsia is an example of the disturbance of function due to a lowered resistance to influences which in the normal individual produce little or no deleterious effect. In such individuals when the nervous tone approaches the normal, a slight disturbance of the liver function, due to excessive ingestion of food, irritating food, etc., is rapidly recovered from. When, however, there is a condition of low nervous tone, or actual nervous exhaustion, a slight disturbance so begun may persist for weeks or months. The general lowering of vital tone as the result of such a condition predisposes the individual to infections of various types. The condition of nervous irritability associated with exhaustion is an important complication, and interferes with the success of the treatment, unless it can be controlled, quite as much as organic disease of the heart, liver, or kidneys. The influence of heredity as an explanation of the lowered resistance of the patient, and the lack of reaction to the

usual methods of treatment, suggest the importance of careful attention to other matters besides the history of tuberculosis in the ancestry of tuberculous patients.

HISTORY OF INSANITY IN THE FAMILY.

History of insanity in family	Was present in	5	35
	Was absent in	25	
	No record in	5	

The history of these five cases is as follows:

Case No. 3731, father died in Kirkbride's Asylum.
Case No. 3915, mother was insane.
Case No. 4097, mother was insane, sister feeble-minded.
Case No. 4313, mother was insane.
Case No. 4383, maternal uncle was insane.

In a discussion of this subject in the Third Annual Report the relations of insanity and heredity, mental and physical deviation, were carefully considered. To what was then said nothing of importance has been added during the past year. The relation of tuberculosis to special forms of mental disease has been carefully considered during the year, but the studies have not advanced sufficiently far to give definite results for publication. In the adolescent form of insanity (dementia præcox) tuberculosis is a very frequent complication. The study of tuberculosis in these patients presents a difficult problem. The respiratory excursion is, as a rule, very markedly diminished, even in the cases which are not in the stuporous stage. It is not uncommon to find expansion reduced to one-half or one-quarter of an inch; in some cases it is impossible to get a record of expansion by the usual method of measurement. The resistance of the patient to examination and the inability to obtain the usual information as to vocal resonance, fremitus, pectoriloquy, etc., all interfere with accurate work. The difficulty of obtaining sputum for examination often excludes this means of diagnosis.

In dementia præcox the thyroid gland is very frequently en-

larged. More recent investigations of the physiology of this gland point to a very decided influence in the oxygenation of the blood. It would seem, therefore, that the combined effect of the decreased respiratory excursion and the disturbance of function of the thyroid gland would offer predisposing factors to the development of tuberculosis in such cases.

The question of a pre-existing tuberculosis must, of course, be taken into consideration. I have shown in previous reports the frequency of symptoms referable to a disturbance of the sympathetic system and of the function of the thyroids. A stimulation of the higher psychic centers by the toxins of tuberculosis may lead those of a sensitive nervous mechanism to overwork and overstrain, with the resulting mental disturbance. The solution of the problem, however, must remain for further investigation.

HISTORY OF NERVOUS DISEASE IN THE PATIENT.

An inquiry as to previous history of epilepsy and chorea has been made in all of the cases examined during the year. A history of chorea was present in only one case, No. 1062. A history of convulsions, however, occurred with much more frequency. Twelve cases in all were recorded; of these, six cases were placed under the epileptic group, and of the other cases, in three it was impossible to differentiate, from the history, whether the attacks were epileptic or hysterical in nature. In case No. 4116 two months previous to admission to the hospital the patient had repeated convulsions after the excessive use of alcohol. In case No. 4344 the patient had two spells of nervousness two months previous to examination. The exact nature of these could not be determined. Case No. 4474 had had several true epileptic attacks in fifteen years, but has had none recently. Case No. 4410 had epileptic convulsions for five years, but has been entirely free from them for a long period of time.

In the analysis of thirty-five hospital cases a history of nervous

disorders in the direct or collateral ancestry gave epilepsy as present in the mother's family once, and as present in a brother once. It is surprising, in view of the irritative changes present in the central nervous system at autopsy, that convulsive disturbances should not occur with much more frequency. Further detailed study may throw some light upon the question of the isolated period of convulsive disturbances noted in cases Nos. 4410 and 4474.

The following case presents much material for study. In addition to the pulmonary tuberculosis there was an associated mental disturbance, a pathological condition of the eye, and a previous history of grave epilepsy. The case is as follows:

Case No. 3731. Age, twenty-five. Female. White. Entered hospital 1 : 31 : '05. Died 4 : 4 : '06. Patient had tuberculosis of the lungs and lower maxilla. Patient had had measles, rheumatism, scarlet fever, and diphtheria. At time of admission patient had cough, pain in the right side, expectoration, and gastric disturbances. There was involvement of both lungs, the upper lobe of the right lung with cavity formation and the entire left lung. Tubercle bacilli were found in the sputum. The urine analysis showed a specific gravity of 1020, an acid reaction, a slight trace of albumin, and no sugar or diazo. Microscopic examination of the urine showed two suspicious hyaline casts and epithelial cells.

Nervous examination: There was no nervous disease in the family with the exception of the father, who died at Kirkbride's Insane Asylum. Patient never went to school. In health was light-hearted and happy, but since illness "has turned melancholy." The mental attitude is generally hopeful, but at times she feels depressed. Several years ago the patient was flighty at times and thought people were talking about her and doing her harm. She sleeps poorly and is very restless. She has disagreeable dreams and night terrors. Patient is very nervous, the slightest noise startles her. Memory is very poor. She imagines she would like to see people and then refuses to do so. Patient hears voices as if some one is calling her; she will not hold long conversations on this account. Revenge appeals to her; she plots to get it and is afraid she will do harm.

Coördination is fair, grip is fair, the muscular power is fair in both upper and lower extremities. The biceps, triceps, knee jerk, and tendo Achillis jerk are all exaggerated. There is exaggerated flexion to plantar irritation. There is no supraorbital reflex and no ulnar reflex. There is a fine tremor

in both hands. The vasomotor tone is fair, there is no von Graefe sign and no retraction of the eyelid.

At thirteen or fourteen years of age she went to a factory and was hit in the left eye with a snowball. One week later, on awakening, she found that she could not see anything (she was operated on by Dr. Cassel). As long as she wore glasses the eye remained straight. One year later, on account of lack of the use of glasses, the eye again became cast. She could not see out of this eye for two years. This was treated by electricity. The associated eye movements are good, also the individual eye movements. There is a closure of a branch of the retinal artery.

Eye examination by Dr. Shumway: The lower branch of the central retinal artery is obliterated; the retina supplied by this vessel is reduced to about one-third of its normal thickness. The nervous elements have entirely disappeared and there has been some overgrowth of the connective tissue. There is complete atrophy of the lower half of the optic nerve, with reduction in calibre of this portion of the nerve and thickening of the septa between the nerve bundles.

The nerve atrophy is well shown in the Weigert preparation.

Pathological report. Cortex: Chronic leptomeningitis along the gyri; no atrophy; no edema; moderate passive congestion; no arteriosclerosis; no distention of the ventricles; ependyma normal.

Microscopic examination: Subependymal sclerosis; choroid plexus of left lateral ventricle cystic and contains a yellow, calcified, caseous, and possibly tuberculous area.

Spinal cord: Veins very tortuous and congested; cord otherwise normal.

Microscopic examination: Subacute degeneration of the white matter, more marked in the central segments. Spinal cord and medulla exceedingly small.

MENTAL ATTITUDE.

Number of patients.

- Whose mental attitude was
  - Before onset of tuberculosis, ...
    - Cheerful, ... 22
    - Pessimistic, ... 5
    - No record, ... 8

    } 35
  - After onset of tuberculosis, ...
    - Changed, ... 18
    - Not changed, ... 9

    } Out of 35
    - Hopeful, ... 28
    - Not hopeful, ... 1
    - No record, ... 6

    } 35
- Who showed evidence of being ...
  - Depressed, ... 11
  - Not depressed, ... 19
  - No record, ... 5

  } 35
  - Suspicious, ... 1
  - Not suspicious, ... 23
  - Doubtful, ... 3
  - No record, ... 8

  } 35

The statistics here recorded differ in some respects from those previously presented. The percentage of cases showing a hopeful mental attitude is much higher than in previous reports. In other respects the statistics agree in a general way with those previously presented. All of the thirty-five cases here analyzed were in an advanced stage of the disease.

SLEEP AND DREAMS.

Patients who slept	Well,	15	35
	Poorly,	16	
	No record,	4	
Number of patients who	Dreamt,	15	35
	Did not dream,	12	
	No record,	8	

Hallucinations of sight are not infrequent occurrences in the border-line between sleeping and waking. Occasionally patients are not able to definitely distinguish episodes of their dream states from natural occurrences. In the advanced cases with marked anemia the dreams are usually of a disagreeable nature, and in one case, No. 4455, the patient used her best efforts to prevent sleep on account of the terrible nature of her dreams. As a rule, she talked actively during the sleeping period.

According to Lagriffe, there is no differentiation except that of degree between dreams and delusions.* It is not surprising, therefore, that with the wasting processes which are present in the brains of patients with advanced tuberculosis dream states should play a rather important rôle in the psychic life of the individual. In the Third Annual Report a case was cited in which the delusion of the patient was born from such a dream state. When suspicion becomes a marked symptom of the psychic side of the tuberculous patient, the direction of the delusions of persecution may be determined by the relics of the previous dream state. Regis,† who considered the condition which he describes as oneiric or dream

* Lucien Lagriffe: "Du Reve au Delire," Gazette des Hôpitaux, 1902, p. 453.

† Grasset: "The Semi-insane and the Semi-responsible."

delirium as due to various types of intoxications and infections, states that "these delusions are born and evolved during sleep; they are formed by the fortuitous association of ideas, by the recalling of hallucinatory images and of previous memories, by scenes of family or professional life, by visions which are often distressing, by strange impossible combinations of events which are principally moving and changing, or, on the contrary, given a peculiar fixedness, which obtrude themselves more or less completely on one's convictions. In its marked form these delusions are wholly nocturnal and temporary; they cease upon waking and do not appear until evening, either toward dusk or not until later, with drowsiness. In a more marked degree they cease upon waking, but not completely, and are reproduced during the day when the patient closes his eyes and dozes. Finally, in its most pronounced form the delirium does not cease in the morning, but continues all day until it becomes truly a prolonged dream. These patients often retain imprinted on their mind, for a greater or less time after they are well, some single obsessive, tenacious, false idea; a residue of the principal conception of their hallucinatory dream; a sort of mono-ideaism, or post-oneiric fixed idea, which is identical with the mono-ideaism, or the post-hypnotic fixed idea."

MEMORY AND DELUSIONS.

Total number of hospital cases,.....122

The record of twelve cases during the year presenting delusional states includes only those cases in which the delusions were definite, and which were not amenable to reason. In other words, temporary hallucinatory conditions are not included. Two cases, Nos. 5039 and 4122, present the clinical picture of pseudo-paresis described in the First and Second Annual Reports. In none of the other cases were the delusions of a fixed nature. Confusion and suspicion dominated the clinical picture of the majority of these.

MUSCULAR POWER.

Number of patients whose muscular power was.....

As indicated by the grip of right hand,.....	Good,.....12 Fair,..... 9 Poor,..... 4 No record,.....10	35
As indicated by the grip of left hand,.....	Good,.....10 Fair,..... 9 Poor,..... 6 No record,.....10	35
In the upper extremities, ...	Good,.....19 Fair,..... 8 Poor,..... 3 No power,..... 1 No record,..... 4	35
In the lower extremities,....	Good,.....20 Fair,..... 8 Poor,..... 4 No record,..... 3	35

The study of the muscular power in tuberculous patients presents a complicated problem. The statistics here presented are of no particular value taken as they stand, and were simply recorded on the history blanks for the study of the individual cases in which they occur. The muscular power of individuals suffering from advanced pulmonary tuberculosis depends not only upon the condition of the muscles, but the general tone of the patient, fever, nervous tone, etc. In the majority of cases the muscles are soft and flabby even before the wasting begins. This may be attributed to lack of exercise and is accentuated by a long rest in bed. The condition of the muscles in patients with approximately the same amount of involvement of the lungs, and who have been sick for the same length of time, varies greatly. The muscles of some patients remain in a fairly good condition, with relatively firm consistence and without marked tenderness, up to the time of death. In other cases the muscular wasting is manifested relatively early and is very marked as the disease progresses. Subacute degenerative processes and other structural conditions (wasting), in the brain and cord, may possibly be a cause of the changes in some cases. Tenderness of the muscles without any other evidence

of neuritis, either in the condition of the reflexes or in the sensory changes, is a not uncommon condition. It must, however, be carefully differentiated from the periosteal tenderness previously mentioned, which occurs with much more frequency. The functional disturbance of the nervous system is manifested by various paresthesias, even in early cases. Various disturbances of sensation are referable to the lower extremities. A feeling of coldness of the hands and feet is the most common of these, and is probably of vasomotor origin. The feeling of tingling, numbness, and a burning sensation must be attributed to a disturbance of the sensory mechanism. The paresthetic disturbance varies from time to time, and disappears with an improvement of the general condition. The sensations complained of are often clear-cut and of a segmental character and the patient is able to detail clearly the particular boundaries of the sensory disturbance. In some cases they are confined to the feet; in others reach to, or above, the knees.

A feeling of muscular weakness which is entirely inconsistent with the condition of the muscles is seen in early cases of tuberculosis when the temperature is normal or nearly normal. It is not infrequent to see marked asthenia in patients with a full muscular development. In such cases a lowered blood-pressure may be an important factor.

COÖRDINATION.

Number of patients whose static coördination was.....	Good,.....	22	35
	Fair,.....	3	
	Swaying,.....	1	
	In bed,.....	2	
	No record,.....	7	
Number of patients whose coördination of arms was.....	Good,.....	29	35
	Fair,.....	1	
	No record,.....	5	

These statistics, like those of the muscular power, were compiled for the purpose of studying the individual cases. The incoördination in advanced cases is most frequently due to muscular

weakness, and where this symptom is used for the purpose of localization of disease processes in the central nervous system, this fact must be kept in mind. For instance, when tabes dorsalis is diagnosed as complicating tuberculosis, the diagnosis must be made upon symptoms other than those of simple incoördination.

REFLEXES.

Ulnar reflex,	Present, 9 Exaggerated, 3 Diminished, 2 Doubtful, 1 Absent, 11 No record, 9	Out of 35 cases
Supraorbital reflex,	Normal, 16 Exaggerated, 4 Absent, 1 No record, 14	Out of 35 cases
Pupils,	React to light, 28 React sluggishly, 1 No record, 6	Out of 35 cases
	Equal, 25 Unequal, 3 No record, 7	Out of 35 cases
Biceps jerk on right side,	Normal, 11 Exaggerated, 15 Slight, 4 Absent, 1 No record, 4	Out of 35 cases
Biceps jerk on left side,	Normal, 9 Exaggerated, 17 Slight, 4 No record, 5	Out of 35 cases
Triceps jerk on right side,	Normal, 12 Exaggerated, 15 Slight, 2 Absent, 1 No record, 5	Out of 35 cases
Triceps jerk on left side,	Normal, 11 Exaggerated, 16 Slight, 2 Absent, 1 No record, 5	Out of 35 cases
Knee jerk on right side,	Normal, 8 Exaggerated, 23 Markedly exaggerated, 1 Diminished, 1 No record, 2	Out of 35 cases

Knee jerk on left side,	Normal, 8 Exaggerated, 21 Markedly exaggerated, 1 Diminished, 3 No record, 2	Out of 35 cases
Tendo Achillis jerk on right side,	Normal, 12 Quickened, 3 Marked, 9 Absent, 2 No record, 9	Out of 35 cases
Tendo Achillis jerk on left side,	Normal, 12 Quickened, 2 Marked, 10 Hard to obtain, 1 Absent, 2 No record, 8	Out of 35 cases
Plantar reflex on right side,	Flexion, 21 Flexion of small toes, 1 Flexion of small toes and a little of big toe, 1 Exaggerated, 3 Doubtful, 1 Babinski phenomenon, 2 No record, 6	Out of 35 cases
Plantar reflex on left side,	Flexion, 20 Flexion of small toes, 1 Flexion of small toes and a little of big toe, 1 Exaggerated, 3 Diminished, 4 No record, 6	Out of 35 cases

The condition of the reflexes agrees with the statistics previously reported. They show, as a rule, a marked hyperexcitability. The Babinski reflex (extension of toes to plantar irritation as opposed to the flexion of the toes in normal individuals) must be taken as an indication of some pathological change in the motor mechanism of the central nervous system. In some cases it is the only objective symptom of an irritative process of the meninges affecting the motor cortex or the conducting paths of the medulla or spinal cord (see case No. 4023). It is of especial value in conjunction with the Gordon paradoxic reflex, in a study of those cases in which the loss of muscular power, incoördination, etc., due to wasting of the muscles in cases of advanced tuberculosis might be attributed to organic changes in the central nervous system.

TREMOR.

Number of patients in whom tremor was .. { Present,.....23; Slight,..... 1; Not present,..... 6; No record,..... 5 } 35

VASOMOTOR TONE.

Number of patients..... { Whose vasomotor tone was..... { Good,..... 4; Fair,..... 6; Poor,.....14 } ; Who were.....Colored,..... 2; Who had..... { Flushing of face,..... 1; No record,..... 8 } } 35

VON GRAEFE SIGN.

Number of patients who had the v. Graefe sign.... { Moderate to marked,..... 1; Suggestive,..... 1; Slight in left eye,..... 1; Absent,.....29; No record,..... 3 } 35

RETRACTION OF EYELIDS.

Number of patients who had retraction of the eyelid,..... { Present,..... 1; Present at times,..... 1; Exaggerated,..... 1; Absent,.....29; No record,..... 3 } 35

CRANIAL NERVES.

Number of patients who had cranial nerves..... { Normal,.....19; Optic nerve degenerated, . 1; No record,.....15 } 35

The statistics of the disturbance of the sympathetic system are of value only when taken in conjunction with other factors considered in the preceding sections. The matter has been described under the heading of muscular power. The condition of the vasomotor tone depends to a large extent upon the pathological conditions in the thyroid, pituitary, adrenals, etc., and not infrequently is a manifestation of the activity of toxins elaborated during the course of the disease. This subject, like that of the blood-pressure, which depends to a large extent upon the vasomotor function, needs much more cumulative study than has been obtained up to the present time before it is at all clear.

D. J. McCarthy.

THE PLEURA IN PULMONARY TUBERCULOSIS.

This study is based upon fifty-nine cases which were autopsied at the Henry Phipps Institute during the year February, 1906, to February, 1907. An effort was made to determine the clinical manifestations of diseased pleura that might be looked upon as diagnostic.

Of the fifty-nine cases, forty-four were males and fifteen females. The average age at death was thirty years; the highest age sixty-three years (case No. 4500), and the lowest fifteen years (case No. 4462). The average duration of illness at time of death was, according to the patient, eighteen and one-third months; the longest one hundred and forty-five months (case No. 4735), and the shortest one month (case No. 4243). According to the opinion of the physician, the average duration of illness at time of death was forty-seven months; the longest two hundred and forty months (case No. 4198), and the shortest five months (cases Nos. 4040 and 4097). The opinion of the physician was arrived at after taking the history and making the physical examination.

HISTORY OF PLEURISY.

A history of pleurisy was given in thirteen cases. The location was recorded in only one case, No. 4364, in which it was said to have occurred on the left side. At autopsy the left pleura was found thickened with old adhesions down to the third rib; elsewhere it was normal. Right pleura was thickened and adherent throughout.

In the remaining twelve cases the location of the pleurisy was not recorded. These cases have been arranged according to the location of the pain complained of.

Pain on the right side and in the abdomen. One case. At autopsy, No. 4587, left pleura, thickened; old adhesions down to fourth rib; elsewhere normal, except for band of adhesions extending from margin of lower lobe to diaphragm. Right pleura, thickened and adherent everywhere.

Pain on the left side. Three cases. At autopsy, case No. 2019, left pleura, cloudy, congested, and thickened; adhesions along margin of costal cartilages down to fourth rib; elsewhere normal. Right pleura, completely obliterated by adhesions. Case No. 4462, left pleura, few recent adhesions along anterior margin of both lobes; elsewhere normal. Right pleura, normal throughout. Case No. 4281, left pleura, recent adhesions posteriorly to anterior axillary line as far down as sixth rib; elsewhere normal. Right pleura, adhesions posteriorly to mid-axillary line as far down as sixth rib; elsewhere normal.

Pain on both right and left sides. One case. At autopsy, No. 2980, left pleura, thickened; firm adhesions down to and along third rib; recent adhesions below to fifth rib; diaphragm adherent; elsewhere normal. Right pleura, thickened; adhesions throughout, complete obliteration.

Pain in the chest. Two cases. At autopsy, case No. 4023, left pleura, thickened throughout; dense adhesions everywhere, especially marked posteriorly. Right pleura, thickened; adherent throughout. Case No. 4221, left pleura, thickened; dense adhesions down to third interspace; elsewhere normal. Right pleura, thickened; recent adhesions everywhere.

Pain not located. One case. At autopsy, No. 4180, left pleura, adherent down to fourth rib anteriorly and posteriorly; below this a few adhesions posteriorly; elsewhere normal. Right pleura, one small adhesion posteriorly over upper lobe; elsewhere normal.

No pain. Three cases. At autopsy, case No. 3953, left pleura, adhesions posteriorly and along side of upper lobe; lower lobe, adherent everywhere. Right pleura, thickened; adherent throughout. Case No. 4164, left pleura, numerous bands of fairly firm adhesions at apex posteriorly and along third and fourth ribs; few recent adhesions over lower lobe. Right pleura, obliterated by recent adhesions. Case No. 4232, left pleura, adhesions anteriorly

along costal margin and third rib to anterior axillary line; posteriorly, adhesions partly recent and partly old above the second rib; elsewhere over upper and entire lower lobes, pleura normal. Right pleura, thickened throughout; adhesions everywhere.

No record of pain. One case. At autopsy, No. 4500, left pleura, thickened anteriorly from apex down to third rib, and as far outward as anterior axillary line; elsewhere normal. Right pleura, firm adhesions at apex anteriorly and posteriorly, and in two areas along third rib; elsewhere normal.

Summary.—All of the fifty-nine cases showed pleural adhesions. There was a history of a previous pleurisy in thirteen. Of the thirteen, nine gave a definite history of pain, three a history of no pain, and in one the symptom of pain was not recorded. Of the three cases giving a history of pleurisy with pain on the left side, one showed a greater pleural involvement on the right, one an equal involvement, and one a normal right pleura. Of the three cases with a history of pleurisy, without pain, all showed complete obliteration of the right pleura and adhesions in the left pleura as marked as were found in the three cases which complained of left-sided pain.

NO HISTORY OF PLEURISY.

Of the forty-six cases in which there was no history of pleurisy, thirty-two were recorded as having had pain, and fourteen as not having had pain. The former are tabulated according to the location of the pain.

Pain on the right side. Four cases. At autopsy, case No. 3393, left pleura, numerous dense adhesions throughout, about 3 cm. long, thus allowing some movement of lung; more numerous posteriorly than anteriorly; no exudate. Right pleura, dense adhesions anteriorly from apex down to third rib and outward to anterior axillary line; elsewhere normal; no exudate. Case No. 3731, left pleura, over upper lobe, thickened; dense adhesions throughout its entire extent; lower lobe, adherent throughout major portion; a few hemorrhagic spots on posterior surface; lower portion, free; no exudate.

Right pleura, upper lobe, thickened at apex; marked adhesions to second rib anteriorly, and slight adhesions to fourth rib posteriorly; middle lobe, thickened but not adherent; lower lobe, normal; a slight amount of exudate. Case No. 1975, left pleura, upper lobe, recent adhesions from apex downward to third rib; elsewhere normal; no exduate. Right pleura, adherent throughout; no exduate. Case No. 3052, left pleura, thickened and obliterated throughout; no exudate. Right pleura, slightly thickened; a few adhesions at extreme apex; elsewhere normal; no exudate.

Pain on the left side. Six cases. At autopsy, case No. 4148, left pleura, adhesions along third and fourth ribs posteriorly from posterior axillary line along whole lung; elsewhere normal; no exudate. Right pleura, upper lobe, dense adhesions at apex posteriorly, recent adhesions along third rib posteriorly to posterior axillary line; remainder of pleura, normal. Middle lobe, recent adhesions posteriorly to posterior axillary line; elsewhere normal. Lower lobe, recent adhesions posteriorly to posterior axillary line; elsewhere normal; no exudate. Case No. 3119, left pleura, adhesions posteriorly at apex and a band of adhesions which curved along course of third rib; elsewhere normal; no exudate. Right pleura, adhesions throughout, dense over apex and posteriorly along whole lung. Case No. 3831, left pleura, adhesions at apex posteriorly extending to anterior axillary line; elsewhere normal; no exudate. Right pleura, normal throughout; no exudate. Case No. 4735, left pleura, adhesions posteriorly and laterally at apex; pleura thickened; whole left chest filled completely with thin pus. Right pleura, normal throughout; normal amount of exudate. Case No. 4345, left pleura, upper lobe, a few firm adhesions along first and second ribs posteriorly; elsewhere normal; slight excess of clear fluid. Right pleura, thickened; dense adhesions everywhere; no exudate. Case No. 4246, left pleura, old and dense adhesions posteriorly as far down as fourth rib; anteriorly thickened to fourth rib; elsewhere normal; no exudate. Right pleura, recent adhesions throughout entire extent; no exudate.

Pain on both right and left sides. Four cases. At autopsy, case No. 4316, left pleura, adherent throughout; no exudate. Right pleura, dense adhesions for a space of 3 cm. over apex posteriorly and recent adhesions as far down as second rib; elsewhere normal; exudate normal. Case No. 4155, left pleura, recent adhesions posteriorly extending from apex downward to sixth rib and as far forward as anterior axillary line; elsewhere normal; no exudate. Right pleura, upper lobe, adhesions extending from apex to third rib anteriorly; elsewhere normal; no exudate. Case No. 4522, left pleura,

friable adhesions everywhere; exudate between base of lung and diaphragm. Right pleura, thickened throughout. No record as to adhesions. Case No. 3643, left pleura, numerous fibrous adhesions obliterating cavity in region of shoulder-joint; elsewhere normal; slight amount of clear fluid. Right pleura, thickened and adherent over upper lobe except at lower portion; adhesions dense and old; elsewhere normal; no exudate.

Pain in the chest. Six cases. At autopsy, case No. 4282, left pleura, upper lobe, adhesions extending along third rib both anteriorly and posteriorly as far forward as anterior axillary line; elsewhere normal; moderate amount of cloudy fluid. Right pleura, adherent posteriorly from apex down to third rib; whole pleural cavity filled with over 1000 c.c. of cloudy fluid. Lower lobe, adhesions between lower part of lobe and diaphragm with considerable congestion and fibrous exudate. Case No. 3548, left pleura, thickened; firm and old adhesions everywhere; no exudate. Right pleura, thickened; adhesions everywhere; no exudate. Case No. 4021, left pleura, thickened; adhesions everywhere down to fifth rib; elsewhere normal; no exudate. Right pleura, narrow band of adhesions downward to second rib and to second interspace; dense adhesions from anterior margin of lung posteriorly along course of second rib and second interspace; elsewhere normal. Pleural cavity, filled with air; a true pneumothorax. Case No. 4010, left pleura, thickened with adhesions everywhere; no exudate. Right pleura, dense adhesions down to fourth rib; elsewhere normal; no exudate. Case No. 3792, left pleura, fibrous but recent adhesions over both lobes; firm adhesions between lower lobe and diaphragm; no exudate. Right pleura, dense adhesions extending anteriorly down to third rib and laterally obliquely to fifth rib; posteriorly, adhesions from apex to fifth rib; elsewhere free except over diaphragmatic surface, where it was firmly adherent. Case No. 4659, left pleura, thickened with fibrous bands of adhesions from apex to fourth rib; elsewhere normal; no exudate. Right pleura, thickened throughout; recent adhesions over upper lobe; no adhesions over lower and middle lobes; no exudate.

Pain in the abdomen. One case. At autopsy, No. 4148, left pleura, adhesions anteriorly along third and fourth ribs and posteriorly everywhere; no exudate. Right pleura, adhesions anteriorly along third rib and posteriorly everywhere.

Pain in the abdomen and throat. One case. At autopsy, No. 4040, left pleura, dull, congested, and cloudy over upper lobe; few friable adhesions

at apex posteriorly; elsewhere free. Lower lobe, visceral layer dull, cloudy, congested and thickened; parietal layer, normal; no adhesions; slight excess of cloudy, bloody fluid. Right pleura, thickened; adhesions everywhere; no exudate.

Pain in abdomen and chest. One case. At autopsy, No. 4198, left pleura, a few recent adhesions at apex posteriorly; elsewhere normal; slight amount of cloudy fluid. Right pleura, thickened throughout; adhesions everywhere; no exudate.

Pain in the throat. Three cases. At autopsy, case No. 3949, left pleura, thickened throughout; adhesions everywhere, obliterating the cavity; no exudate. Right pleura, thickened throughout; adhesions everywhere, obliterating the cavity; no exudate. Case No. 3941, left pleura, thickened; dense adhesions down to and along course of third rib; elsewhere normal; no exudate. Right pleura, thickened throughout; firm and dense adhesions everywhere; no exduate. Case No. 4287, left pleura, thickened; adhesions over upper lobe down to fourth rib anteriorly and to fifth rib posteriorly; elsewhere normal; no exudate. Right pleura, dense adhesions at apex posteriorly; elsewhere normal; no exudate.

Pain not located. Six cases. At autopsy, case No. 3907, left pleura, recent adhesions to mid-clavicular line; elsewhere normal; no exudate. Right pleura, upper lobe, thickened; a few recent and a few dense adhesions to third rib; elsewhere normal; slight amount of exudate. Case No. 3677, left pleura, dense adhesions at apex and recent adhesions downward to third rib; elsewhere normal; no exudate. Right pleura, obliterated throughout; interlobar pleura, markedly thickened and fibrous; no exudate. Case No. 4224, left pleura, thickened; dense adhesions downward to fourth rib anteriorly and posteriorly; elsewhere normal; slight amount of clear fluid. Right pleura, one small band of adhesions posteriorly, 4 cm. below extreme apex; elsewhere normal; slight amount of clear fluid. Case No. 3931, left pleura, upper lobe, moderately dense adhesions throughout; lower lobe, adhesions here and there, not dense; no exudate. Right pleura, thickened throughout; adhesions everywhere; no exudate. Case No. 903, left pleura, thickened throughout; firm adhesions everywhere, excepting the lower two inches; about two ounces of dark, yellowish fluid in pleural cavity. Right pleura, thickened throughout; dense adhesions everywhere; adhesions most marked at apex posteriorly; pleura over apex, five-eighths of an inch thick, cartilaginous; no exudate. Case No. 4197, left pleura, thickened; recent adhesions

from apex downward to third rib anteriorly and outward to anterior axillary line; posteriorly adhesions dense from apex to third rib; elsewhere normal; slight amount of clear fluid. Right pleura thickened; adhesions from apex downward to second interspace and running along course of fifth rib; elsewhere normal; no exudate.

No pain. Fourteen cases. At autopsy, case No. 3961, left pleura, thickened; firm adhesions with obliteration down to fourth rib; below this pleura normal, except for an adhesion on diaphragmatic surface. Right pleura, dense adhesions everywhere. Case No. 4719, left pleura, dense adhesions throughout, except over an area the size of a hand, on posterior lateral aspect; over lower and posterior part adhesions three-fourths of an inch thick; very firm adhesions between lung and diaphragm. Right pleura, dull, cloudy and pale throughout; no adhesions; whole of right pleura filled with clear, yellowish fluid. Case No. 3896, left pleura, firm adhesions throughout, except over an area anterior to an oblique line extending from sterno-clavicular junction to fifth rib in anterior axillary line; a moderate amount of clear fluid. Right pleura, marked adhesions at apex; elsewhere normal; no exudate. Case No. 3887, left pleura, few recent adhesions along anterior margin of lung; elsewhere normal; no exudate. Right pleura, upper lobe, thickened; adhesions everywhere extending two inches wide by one inch deep; band running obliquely from right shoulder-joint to top of upper lobe; remainder normal throughout; no exudate. Case No. 4243, left pleura, thickened; adhesions down to fourth interspace; elsewhere normal; no exudate. Right pleura, normal throughout; no adhesions; no exudate. Case No. 4460, left pleura, thickened; recent adhesions down to fourth rib; elsewhere normal; normal amount of clear fluid. Right pleura, thickened; recent adhesions along third rib; elsewhere normal; small amount of exudate. Case No. 4248, left pleura, thickened throughout; adhesions everywhere; no exudate. Right pleura, thickened throughout; adhesions everywhere; no exudate. Case No. 4380, left pleura, irregular bands of adhesions extending from apex downward to fourth rib both anteriorly and posteriorly; adhesions, old isolated fibrous bands; elsewhere normal; no exudate. Right pleura, thickened; adhesions from apex downward as far as fifth rib both anteriorly and posteriorly; elsewhere normal; no exudate. Case No. 4306, left pleura, thickened; adhesions extending anteriorly from apex down to third rib and along this rib to anterior axillary line, then to and along course of sixth rib; remainder from third rib downward anteriorly and from third rib downward posteriorly normal; slight amount of exudate. Right pleura, thickened; adhesions from apex downward to third rib anteriorly and to fifth

rib posteriorly; below these lines normal; no exudate. Case No. 4416, left pleura, thickened throughout; moderately old and firm adhesions everywhere; no exudate. Right pleura, thickened throughout; old and firm adhesions everywhere; no exudate. Case No. 3880, left pleura, thickened; adhesions throughout anteriorly to anterior axillary line; normal over posterior part of lower lobe; no exudate. Right pleura, thickened everywhere; adhesions throughout, except from seventh rib downward; no exudate. Case No. 4097, left pleura, thickened; adhesions from apex down to line of third rib; elsewhere normal; slight amount of clear fluid. Right pleura, thickened throughout; adhesions everywhere; no exudate. Case No. 4371, left pleura, irregular bands of adhesions from apex down to third rib outside mid-clavicular line; elsewhere normal; slight amount of bloody fluid. Right pleura, thickened throughout; adhesions everywhere; no exudate. Case No. 4272, left pleura, thickened throughout; dense adhesions posteriorly; cavity contained about 1000 c.c. of clear fluid which filled it about one-third its capacity. Right pleura, normal throughout; no adhesions; no exudate.

Summary.—Pain was present in thirty-two out of forty-six cases in which there was no history of pleurisy recorded. It was located in the chest alone in six cases; in the abdomen and chest in one case; on the right side in four cases; on the left side in six cases; on both right and left side in four cases; in the abdomen in one case; in the throat in three cases; in the abdomen and throat in one case; and it was not located at all in six cases. Pain was entirely absent in fourteen cases. Pain as a symptom of pleurisy needs to be more carefully studied. Of the four cases with right-sided pain, three had the left pleura more extensively involved, one the right. Of the six cases with left-sided pain, four had the right more extensively involved. Of the four cases with pain on both right and left sides, all had the left pleura more involved. Of the fourteen cases without pain, the right pleura was more extensively involved than the left; both pleuræ were more or less involved in six; the right pleura was obliterated in four; the left in two; both in two.

The absence of pain is of note on account of the prevalent idea that when no pain exists the lungs and pleura are not diseased.

Pain is often most marked on the least affected side, contrary to the general belief that the most extensive disease is on the side which causes most discomfort. It may be that the lung which is primarily diseased may have extensive involvement of the pleura without any discomfort; and that when the pleura over the other lung becomes involved, pain is produced, because the secondarily affected lung is doing extra work, making its movements more extensive.

DEPRESSION ABOVE CLAVICLE.

The opinion has long been held that an adherent pleura, if of long duration, must of necessity produce some deformity of the chest. The most common form of this deformity is depression above the clavicle or a depression of some of the interspaces, or even a flattening of all or of a large portion of the chest. The depression above the clavicle is so common, and the statistics in these fifty-nine cases so uniform, that only the cases in which the depression was absent are considered.

Depression absent above right clavicle. Four cases. At autopsy, case No. 4180, right pleura, one small adhesion posteriorly at apex; elsewhere normal. Lung, two small cavities in apex, one at extreme apex, measuring 5 mm., surrounded by fibrous tissue and coalesced tubercles posteriorly and by soft lung anteriorly; the other, measuring 10 by 6 by 6 mm., 1 cm. below apex in mid-clavicular line; posteriorly, upper one-third of lobe air-bearing; remainder of lobe consolidated. Case No. 3887, right pleura, adhesions everywhere except toward shoulder-joint, where, in upper lobe, there was a large cavity filled with pus; remainder of pleura free. Case No. 3907, right pleura, upper lobe dull, pale and thickened; a few recent and a few dense adhesions down to third rib; elsewhere normal. Upper lobe, chain of small cavities extending fr m apex along anterior margin of lung to mid-clavicular line. Case No. 4345, right pleura, upper lobe, thickened; everywhere adherent. Upper lobe, three small cavities in lower part; no cavity in apex.

Depression absent above left clavicle. Four cases. At autopsy, case No. 4243, pleura, upper lobe, thickened; everywhere adherent. Whole lobe

consolidated with an old cavity about 8 cm. below extreme apex in anterior axillary line. Case No. 3831, pleura, upper lobe, glistening, transparent and pale, except for a dense adhesion at apex anteriorly and posteriorly to anterior axillary line. Whole lobe, practically one large cavity, irregularly loculated; largest compartment measured 8 by 7 by 4 cm. Case No. 3907, pleura, glistening, transparent and pale, except for a few recent adhesions to mid-clavicular line. At extreme apex of lobe, a cavity 1.5 by 1 by .75 cm.; anteriorly to this another cavity; elsewhere in lobe numerous small cavities especially marked on anterior surface. Case No. 4345, pleura, normal except for a few firm adhesions along first and second ribs posteriorly. Whole lobe, one large loculated cavity.

In all of these eight cases with absence of depression above the clavicle there was adhesion of the pleura over the upper lobe and disease of the upper lobe of the lung which reduced the size of the lung. Just why depression above the clavicle did not occur in these instances, it is impossible to say. In contrast to these cases may be mentioned those in which the pleura was found to be without adhesion. There were five of these, all on the right side. In four of them there was a depression above the clavicle, in one case there was no record.

RETRACTION OF THE INTERSPACES ON INSPIRATION, LEFT CHEST.

This symptom was definitely recorded in twenty-three cases. As the observations vary somewhat in their completeness, it is necessary to arrange the cases under several headings, under each of which there is given a brief summary of the pleural condition found at autopsy.

Retraction of the interspaces present both anteriorly and posteriorly. Ten cases. At autopsy, case No. 4097, left pleura, dull, cloudy and congested; a few friable adhesions at apex posteriorly; elsewhere free. Lower lobe, visceral layer, dull, cloudy and congested; parietal layer normal; no adhesions; slight excess of cloudy, bloody fluid. Case No. 4180, pleura, upper lobe, adherent down to fourth rib; lower lobe, a few friable adhesions; no exudate. Case No. 3393, numerous adhesions over entire pleura; dense throughout;

some 3 cm. long permitting of considerable movement of the lung, especially anteriorly; between adhesions pleura pale, glistening and transparent; no exudate. Case No. 3880, pleura, thickened and adherent to anterior axillary line; below free; no exudate. Case No. 3907, a few recent adhesions in mid-clavicular line; elsewhere pleura normal over both lobes; small amount of clear fluid. Case No. 3961, pleura, upper lobe, firmly adherent down to fourth rib anteriorly and posteriorly; elsewhere normal except that lower lobe is adherent to diaphragm; no exudate. Case No. 4021, pleura, thickened and adherent down to fifth rib; below free; slight amount of exudate. Case No. 4023, pleura, thickened; dense adhesions over both lobes; no exudate. Case No. 4040, visceral layer, dull, congested and cloudy over both lobes; a few friable adhesions over apex posteriorly; parietal layer, normal; slight excess of cloudy, bloody fluid. Case No. 4287, pleura, upper lobe, obliterated by adhesions down to fourth rib anteriorly and to fifth rib posteriorly; below normal; no exudate.

Retraction of the interspaces absent both anteriorly and posteriorly. Two cases. At autopsy, case No. 4460, pleura, upper lobe, thickened; recent adhesions down to fourth rib anteriorly and posteriorly; below, normal; normal amount of clear fluid. Case No. 3643, numerous fibrous adhesions, stringy in texture, obliterating pleural cavity in region of shoulder-joint; remainder of pleura, normal; slight amount of clear fluid.

Retraction of the interspaces present anteriorly and absent posteriorly. Two cases. At autopsy, case No. 4272, pleura, upper lobe, dull, cloudy, pale and thickened; dense adhesions posteriorly over both lobes; pleural cavity contains about 1000 c.c. of clear fluid, filling about one-third of cavity. Case No. 1975, pleura, normal except for recent adhesions along third rib; no excess of fluid.

Retraction of the interspaces present posteriorly and absent anteriorly. One case. At autopsy, No. 4371, pleura, upper lobe, generally normal, except for irregular bands of adhesions from apex downward to third rib outside mid-clavicular line. Lower lobe, pleura, normal; slight amount of bloody fluid.

Retraction of the interspaces present anteriorly with no record posteriorly. Five cases. At autopsy, case No. 4155, entire pleura, both lobes, thickened; dense adhesions binding lung closely to chest wall; no exudate. Case No. 4164, upper lobe, numerous bands of fairly firm adhesions at apex posteriorly and under third and fourth ribs; elsewhere normal. Lower lobes, pleura,

normal, except for a few recent adhesions, location of which was not given at autopsy; no exudate. Case No. 4659, pleura, upper lobe, thickened with fibrous bands of adhesions from apex down to fourth rib; remainder of pleura, both lobes, normal; no exudate. Case No. 3731, pleura, adherent and thickened over entire upper lobe and over a large part of lower lobe; only lower portion free; no exudate. Case No. 4345, pleura, normal over both lobes except for a few firm adhesions along first and second ribs posteriorly; small amount of slightly cloudy fluid.

Retraction of the interspaces present posteriorly with no record anteriorly. Two cases. At autopsy, case No. 4168, pleura, thickened; everywhere adherent; no exudate. Case No. 3941, pleura, thickened; densely adherent over apex and down to third rib; elsewhere over upper and entire lower lobes, normal; no exudate.

Retraction of the interspaces absent anteriorly with no record posteriorly. One case. At autopsy, No. 4281, pleura, recent adhesions posteriorly from apex downward to sixth rib and anteriorly as far as anterior axillary line; remainder normal.

Summary.—In the twenty-three cases retraction of the interspaces was definitely recorded as being present anteriorly seventeen times. Of these seventeen cases, the pleura over the lower lobe was found to be adherent in six and non-adherent in nine. In one case there was adhesion to the diaphragm, and in one there was pleural effusion filling about one-third of the pleural cavity. Retraction was recorded posteriorly in thirteen cases, of which the pleura over the lower lobe was found to be adherent in five, non-adherent in seven, and the diaphragm adherent in one. Retraction was recorded absent anteriorly in four cases, in which the pleura was found to be non-adherent over the lower lobe. The pleura was more or less adherent over the upper lobe in all cases.

RETRACTION OF THE INTERSPACES ON INSPIRATION, RIGHT CHEST.

This was noted completely or partially in twenty-six cases. As the observations vary somewhat in their completeness, it is neces-

sary to arrange the cases under several headings. Under each of these headings there is given a brief summary of the pleural condition found at autopsy.

Retraction of the interspaces present anteriorly and posteriorly. Seven cases. At autopsy, case No. 4097, pleura, thickened; recent adhesions everywhere; no exudate. Case No. 4164, pleura, entire lung, obliterated by recent adhesions; no exudate. Case No. 3880, pleura, adherent throughout its entire extent, except for a small portion over lower lobe, extending from seventh rib downward; no exudate. Case No. 3907, pleura, upper lobe, dull and thickened; a few recent and a few dense adhesions down to third rib; remainder of pleura, normal; slight amount of exudate. Case No. 4023, pleura, thickened; adhesions over all portions; no exudate. Case No. 4040, pleura, everywhere thickened; obliterated by adhesions; no exudate. Case No. 4460, pleura, upper lobe, thickened; recent adhesions to third rib; remainder of pleura, normal; small amount of exudate.

Retraction of interspaces present anteriorly with no record posteriorly. Seven cases. At autopsy, case No. 4155, pleura, upper lobe, normal except for some adhesions posteriorly extending from third rib to apex of lung; elsewhere normal; no exudate. Case No. 4159, pleura, upper lobe, thickened; recent adhesions throughout; middle lobe, thickened; no adhesions; lower lobe, thickened; no adhesions; no exudate. Case No. 4735, pleura, throughout its entire extent, normal; no adhesions; normal amount of exudate. Case No. 3731, pleura, upper lobe, dull, congested and thickened at apex; dense adhesions to second rib anteriorly, and slighter adhesions to fourth rib posteriorly; middle lobe, slightly thickened; no adhesions; lower lobe, normal; no adhesions; slight amount of exudate. Case No. 4021, upper lobe, dull, cloudy and thickened; a narrow band of adhesions to second rib and to second interspace; dense adhesions from anterior margin of lung posteriorly along course of second rib and second interspace; no record as to the pleura over two lower lobes. Case No. 4316, pleura, upper lobe, normal with exception of apex, where for a space of 3 cm. there were dense adhesions anteriorly and posteriorly with some recent adhesions to second rib; remainder of pleura, normal throughout; normal amount of exudate. Case No. 4345, pleura, thickened and densely adherent throughout its entire extent; no exudate.

Retraction of the interspaces present anteriorly and absent posteriorly. Three cases. At autopsy, case No. 3961, pleura, densely adherent through-

out its entire extent; no exudate. Case No. 4272, pleura, normal throughout its entire extent; no adhesions; no exudate. Case No. 1975, pleura, thickened throughout; adhesions everywhere; no exudate.

Retraction of the interspaces present posteriorly with no record anteriorly. Five cases. At autopsy, case No. 4168, pleura, adherent and thickened throughout its entire extent; no exudate. Case No. 4180, pleura, upper lobe, posteriorly one small adhesion; remainder, normal throughout; no adhesions; no exudate. Case No. 3887, pleura, upper lobe, thickened and everywhere adherent, except for a space two inches wide by one inch deep, part of a sinus which ran obliquely to right shoulder-joint; lower and middle lobes, normal; no exudate. Case No. 4371, pleura, thickened throughout; dense adhesions everywhere; no exudate. Case No. 3941, pleura, thickened throughout; dense adhesions everywhere; no exudate.

Retraction of interspaces absent both anteriorly and posteriorly. Three cases. At autopsy, case No. 3393, pleura, upper lobe, dense adhesions anteriorly extending from apex to third rib, and outward to anterior axillary line; remainder of anterior surface and all of posterior surface, normal; no exudate. Case No. 3643, pleura, upper lobe, thickened; dense adhesions over upper part of lobe; lower border of lobe, free; lower and middle lobes, pleura normal; no adhesions; no exudate. Case No. 4287, pleura, upper lobe, normal, except for some dense adhesions at apex posteriorly; remainder, normal throughout; no adhesions; no exudate.

Retraction of the interspaces present anteriorly, with no record posteriorly. One case. At autopsy, No. 4281, pleura, upper lobe, anteriorly normal; posteriorly adhesions which were easily broken and extended to mid-axillary line; middle lobe, normal; lower lobe, dense adhesions anteriorly to sixth rib; posteriorly to mid-axillary line, and extending upward over this to apex; below, normal.

Summary.—In the twenty-six cases retraction of the interspaces was definitely recorded as present anteriorly in eighteen. In these eighteen cases the pleura was found to be adherent over the middle and lower lobes in nine; non-adherent in eight; no record of the pleura over the middle and lower lobes in one. Retraction of the interspaces was recorded as absent in three cases, in all of which the middle and lower lobes were found

free of adhesions. Retraction of the interspaces posteriorly was recorded as present in twelve cases. In these twelve cases the pleura was adherent over the middle and lower lobes in eight and non-adherent in four. Retraction of the interspaces was definitely stated as absent posteriorly in six cases. In these six cases the pleura over the middle and lower lobes was adherent in two and non-adherent in four.

Retraction of the interspaces on inspiration has been given as a symptom of adherent pleura. From these cases it would appear of value as a positive sign, but of less value as a negative sign. It is of sufficient importance to justify a more careful study of the movements of the chest during respiration.

RELATIONSHIP BETWEEN ADHERENT PLEURA AND CAVITY FORMATION.

LEFT SIDE.

Upper Lobe: Of the fifty-nine cases reported on, a thickened pleura was found over the upper lobe to a greater or less extent in all cases; a thickened pleura with cavity formation in fifty-one cases; and a thickened pleura without cavity formation in eight cases.

Lower Lobe: A thickened pleura with cavity formation was found in the lower lobe in twenty-two cases; a thickened pleura without cavity formation in thirteen cases; a cavity without pleural involvement in eight cases; and no pleural involvement with no cavity formation in sixteen cases.

RIGHT SIDE.

On the right side there were found two cases of pleural effusion, and one case in which no statement was made regarding pleura over lower lobes. Of the remaining fifty-six cases, more or less pleural adhesion was found in fifty-two, and none in four.

Upper Lobe: Of the fifty-six cases in which adhesion occurred, thickening and adhesion of the pleura with cavity formation were

found in forty-six; thickening of pleura without cavity formation in five; cavity formation without pleural adhesion in one; a normal pleura without cavity formation in four.

Middle Lobe: Thickened and adherent pleura with cavity formation was found in sixteen cases; thickened and adherent pleura without cavity formation in seventeen; cavity formation without pleural adhesion in six; and a normal pleura without cavity formation in seventeen.

Lower Lobe: Thickened and adherent pleura with cavity formation was found in seventeen cases; thickened pleura without cavity formation in sixteen; cavity formation without pleural adhesion in eight; and normal pleura without cavity formation in fifteen. In only one case out of the fifty-nine was there a cavity in the lower lobe without cavity formation in the remainder of lung. This was in case No. 4522.

This patient died of left-sided pyopneumothorax. At autopsy the right upper and middle lobes contained areas of bronchopneumonia with marked anthracotic pigmentation. Throughout the lobe there were numerous isolated and coalesced tubercles. There was a cavity in the lower lobe posteriorly about 2 cm. from base, measuring 6 by 4 by 4.5 cm. The pleura over the lung was thickened, but not adherent.

The record of the physical examination of the chest before onset of the pneumothorax is as follows:

Right side, anteriorly, inspection shows depression above clavicle and motion increased. On palpation, fremitus is increased above clavicle and in first and second interspaces; absent below. On percussion, there is tympany above clavicle and in first interspace, dullness in second and third, impairment in fourth, hyperresonance in fifth. Vocal resonance is increased above clavicle and in first and second interspaces; there is pectoriloquy above clavicle and in first interspace. Breathing is blowing in character above clavicle and in first interspace, bronchial in second interspace, bronchovesicular in third, fourth, and fifth interspaces. There are fine, moist râles throughout.

Posteriorly, inspection shows scapular muscles atrophied. On palpation, fremitus is increased in first two interspaces, absent in third and fourth,

decreased in fifth. On percussion, there is tympany in first interspace, dullness in second, impairment in third, hyperresonance in fourth, flatness in fifth. Vocal resonance is increased in first two interspaces, absent in third interspace, decreased in fourth and fifth; there is pectoriloquy in first interspace. Breathing is blowing in first interspace, bronchial in second, bronchovesicular in third, absent in fourth and fifth. There are fine, moist râles in first three interspaces, none below.

Left side, anteriorly, inspection shows depression above and below clavicle; motion diminished; interspaces bulge. On palpation, fremitus is increased above clavicle and in first interspace, decreased below. On percussion, there is dullness above clavicle and in first interspace, tympany in second and third interspaces, flatness below. Vocal resonance is increased above clavicle, absent below; there is no pectoriloquy. Breathing is bronchial above clavicle, amphoric in first and second interspaces, absent below. There are fine, moist râles above clavicle and in first interspace.

Posteriorly, inspection shows expansion poor, interspaces bulging. On palpation, fremitus is increased in first two interspaces, absent in third, decreased in fourth and fifth. On percussion, there is dullness in first three interspaces, flatness in fourth and fifth. Vocal resonance is increased in first two interspaces, decreased in third, fourth, and fifth; there is no pectoriloquy. Breathing is bronchial in first and second interspaces, absent below. There are fine, moist râles in first, second, and third interspaces, none below.

As already mentioned, but five of the fifty-nine cases showed a normal pleura, that is, a pleura without adhesions, all on right side. On the other hand, it may be pointed out that complete adhesion of the pleura was found in twenty-nine cases on the right side, and only in seventeen cases on the left. This discrepancy is so striking that it justifies comparison of this series of cases with cases previously autopsied at the Phipps Institute. In our Third Annual Report obliteration of the pleura was recorded twenty-three times on the right side, and twenty-two times on the left, out of fifty-seven cases. In the present series the right pleura shows complete adhesion more frequently than in the series reported in the Third Annual Report. The explanation may be found in the ambiguity of the terms "complete adhesion" and "obliteration of the pleura."

If this relatively greater involvement of the right pleura is found to be constant in future autopsies, it would tend to verify the assumption that tuberculosis starts more frequently on the right side.

The practically constant association of a thickened and adherent pleura with cavity formation in the upper lobes must have a distinct influence upon the physical signs, especially the percussion note. It seems very probable that the tympanitic note, so commonly found over cavities in the upper lobes, owes some of its peculiar characteristics to the thickened pleura.

PNEUMOTHORAX.

In the fifty-nine cases coming to autopsy, there were four cases of pneumothorax (6.8%). Of these, three were left-sided, and one right-sided. All the patients were males. The following is a synopsis of the case of right-sided pneumothorax:

Case No. 4021. Sudden onset with pain along the costal margin. On inspection, the right chest was larger, and the interspaces were fuller than on the left, but there was no bulging. There was distinct retraction of the interspaces on inspiration from the third rib down to the costal margin. Fremitus was everywhere increased. Percussion was hyperresonant throughout. The breathing was rather harsh and indistinct on inspiration, and the expiration was only a series of creaking sounds. There was no metallic tinkle, no Hippocratic splash, and the coin test was doubtful. Posteriorly, inspection was the same as anteriorly. Fremitus was increased to mid-scapula with distinct rhonchal fremitus; below fremitus was normal. Percussion was hyperresonant throughout. Vocal resonance was increased throughout. The breathing was bronchial and of almost a cavernous character as far down as the mid-scapula. Below it was faintly bronchial. There were râles down as far as the mid-scapula, and creaking sounds below this.

At autopsy, right pleura was found to be free, except for a narrow band of dense adhesions running along second rib and second interspace anteriorly to posterior margin of lung. There was no exudate in pleural cavity except gas. Right lung was collapsed. A cavity was found in apex of upper lobe anteriorly, and measured 10 by 8 by 4.5 cm. Small cavities were found in

both middle and lower lobes. After death, the chest was again examined, but the coin test could not be elicited. A hollow needle connected with a mercury manometer was introduced in the interspaces, from the first to the sixth inclusive. A positive pressure of plus 6 mm. of mercury was found in all interspaces except the second. It will be remembered that in the second interspace there were dense adhesions, while the remainder of the pleura was free.

At autopsy, left pleura showed thickening with dense adhesions everywhere down to fifth rib; below it was free. There was no record as to the pathological condition in left upper lobe. The lower lobe showed consolidation of upper quarter, due to coalesced tubercles. The remainder of lobe showed marked edema, with areas of coalesced tubercles. There was a slight amount of exudate in pleural cavity. Duration of illness after onset of the pneumothorax was two days.

There were three cases of left-sided pneumothorax, namely, cases Nos. 4272, 4522, and 4735.

Case No. 4272. Left chest, anteriorly, inspection showed side to be larger, with diminished motion and interspaces bulging. Fremitus was decreased throughout. There was hyperresonance throughout. Vocal resonance was increased above clavicle and in first interspace; absent below. Breathing was feeble above second rib and absent below. Posteriorly, inspection was the same as anteriorly. Fremitus was diminished, percussion was hyperresonant throughout. Vocal resonance was normal to mid-scapula and diminished below. There was no pectoriloquy. The breathing sounds were feeble and distant over the root of the lung and absent below. There were no râles. The coin test was present, but there was no metallic tinkle, no Hippocratic splash, and no movable dullness. The heart was displaced to the left; the liver and spleen could not be felt. Post mortem a hollow needle thrust into the interspaces showed a positive pressure of 10 mm. of mercury in the first six.

At autopsy, the pleura over the upper lobe showed firm and thick adhesions. There were dense adhesions posteriorly. Over lower lobe the pleural cavity contained about 1000 c.c. of clear fluid, which filled one-third of the cavity. The upper lobe was collapsed, dark in color, and contained several small cavities about 1 cm. in diameter. Lower lobe was also collapsed. In the anterior part of lobe there was a cavity 4 by 1.5 by 6 cm. Posteriorly there was a cavity 3.5 by 4 by 2 cm. This was in communication with a small cavity

situated at the base. A perforation was found posteriorly. It was about 2 mm. in diameter and about 8 cm. from the root of the lung. The perforated cavity measured 2.5 by 1.5 by 3 cm. Both lobes were distinctly anthracotic. The duration of illness in this patient was about two weeks after the onset of the pneumothorax.

Case No. 4522. Left chest, no record of inspection or palpation. There was hyperresonance throughout except for movable dullness at the base. The heart was displaced to the right. The vocal resonance was increased over the upper lobe posteriorly and was normal over the lower lobe. There were crepitant râles over the lower lobe. The coin test was present when the patient was lying on his back or on the right side. There was no Hippocratic splash.

At autopsy, the pleura over the upper lobe was thickened and showed adhesions down to the fifth rib. These adhesions did not obliterate the cavity completely. There were a few friable adhesions between the pleura of the lower lobe and the diaphragm. All of the pleura was thickened and covered by a pyogenic membrane. There was a large collection of thin, greenish pus chiefly between the lower lobe and the upper surface of the diaphragm. The perforation was found at the base of the upper lobe in the posterior axillary line.

Case No. 4735. Left chest, larger than right. The fremitus is increased as far down as the level of the fourth rib. Below this it is absent. On percussion there was hyperresonance as far down as the level of the fourth rib with dullness below this level. Vocal resonance was increased down to the fourth rib, absent below. The coin test and the Hippocratic splash were present. The heart was displaced to the right side.

At autopsy the left pleural cavity was filled with thin pus and air, compressing the lung to such an extent that it could not be weighed or measured. The perforation was found at the base of the lower lobe anteriorly.

NORMAL PLEURA.

A normal pleura was found in cases Nos. 4272, 4243, 4735, 3831, and 4462, all the right side. These five cases are given in detail.

Case No. 4243. Male, aged thirty-two; no family history of tuberculosis; no history of previous pneumonia. Duration of illness, previous to admission,

according to the patient, one month; according to the physician, one year. He was only four days under treatment and he died suddenly from hemorrhage.

Autopsy: Left pleura, adherent down to fourth interspace, below this free; no exudate. Left upper lobe consolidated, of a grayish-red color with a cavity about 8 cm. below extreme apex in the anterior axillary line at about third interspace. The cavity was old and surrounded by considerable fibrous tissue and recent pneumonic infiltration, and was filled with blood. Left lower lobe, consolidation of the anterior part, occupying about one-seventh of apex. The process was similar to that in the upper lobe. There were throughout it a few scattered and very small grayish tubercles.

Record of physical examination: Left side, anteriorly, no depressions; expansion, nourishment, and development good; palpation not made. Percussion, dullness in third and fourth interspaces to outer side of the heart area; otherwise normal. Vocal resonance normal. Breathing not mentioned. Crepitant râles over third and fourth interspaces, corresponding to area of dullness. Posteriorly, on inspection, slight depression above scapula, no winging of scapula. Palpation, fremitus normal. Percussion note normal throughout. Vocal resonance normal. Breathing, bronchovesicular; no râles.

Autopsy: Right pleura, normal throughout; no adhesions; no exudate. Upper lobe of lung distinctly congested; numerous areas of anthracosis; several isolated tubercles; at base, posteriorly, a bronchopneumonic area about 3 cm. in diameter. Middle lobe much the same as upper except that the congested pneumonic area is smaller. Lower lobe the same as the two upper with an area of pneumonia at apex posteriorly.

Record of physical examination: Right side, anteriorly, depressions above and below clavicle with good expansion. Palpation not made. Percussion note impaired to third rib and normal below. Vocal resonance normal. Breathing, somewhat asthmatic with dry râles down to third rib. Below third rib breathing normal. Posteriorly, on inspection, slight depression above scapula, but no winging of scapula. Palpation, percussion, and vocal resonance normal. Breathing, bronchovesicular.

It is of interest to note in this case that there was depression above and below the right clavicle, although the pleura was normal, and there was no disease of the lung to diminish its size, while on the left side, with adherent pleura and a cavity of long standing in upper lobe, there was no depression above or below clavicle.

Case No. 4272. Male, aged forty-nine; family history of tuberculosis; no history of pleurisy or pneumonia; no pain. Duration of illness, previous to admission, according to both physician and patient, nine months. Under treatment thirty-three days.

Autopsy: Left side, pneumothorax with about 1000 c.c. of clear fluid filling the cavity to about one-third its extent. Pleura over upper lobe, firm adhesions posteriorly about one-fourth of an inch thick; over lower lobe also thickened with dense adhesions posteriorly. Upper lobe collapsed, dark in color, has several small cavities, and a perforation in posterior part of lobe about 8 cm. from root of lung. Opening of perforation about 2 mm. in diameter, leads into a cavity 2.5 by 1.5 by 3 cm. Lower lobe collapsed, dark in color, with marked anthracosis.

Record of physical examination: Left side, anteriorly, larger than right, motion diminished; interspaces bulging. Palpation, fremitus decreased throughout. Percussion, hyperresonance throughout. Vocal resonance increased in first interspace and above clavicle; elsewhere absent. Breathing, feeble above second rib, and practically absent below second rib. Posteriorly, on inspection, the same conditions. Palpation, fremitus decreased. Percussion, hyperresonance throughout. Vocal resonance normal to midscapula, decreased below. No pectoriloquy. Breathing very feeble and distant over root of lung and absent below. No râles; no metallic tinkling; no Hippocratic splash; no movable dullness. Coin test present. Heart displaced to right. Liver and spleen not felt.

Autopsy: Right pleura, normal throughout; no exudate. Upper lobe of lung, edema, anthracosis, and a few scattered gray tubercles. Middle lobe similar to upper. Lower lobe, at apex posteriorly a large isolated area of tuberculous bronchopneumonia, measuring 4 by 3 by 2 cm., containing caseous areas; elsewhere marked edema and anthracosis; a few isolated, gray tubercles in several places occurring in groups.

Record of physical examination: Right side, depression anteriorly, above and below clavicle; expansion poor; inspiratory retraction of interspaces between third and sixth ribs. Palpation, fremitus increased to third rib and decreased below. Percussion, slight dullness as far down as third rib with hyperresonance below. Vocal resonance increased as far down as fourth rib and decreased below. Breathing, bronchial and obscured by râles as far down as fourth rib; below this breathing sounds absent. Râles throughout the whole lung. Doubtful pectoriloquy above clavicle. Posteriorly, on inspection, expansion poor; no inspiratory retraction. Palpation, fremitus increased throughout except just at base. Percussion, dullness to mid-

scapula with impairment below. Vocal resonance increased throughout; no pectoriloquy. Breathing, bronchial as far down as end of scapula, and bronchovesicular below. Numerous râles throughout.

In this, as in the preceding case, there was a depression above and below the clavicle on the right side, in spite of the fact that the pleura was normal and there was no condition in the right lung which diminished its size.

Case No. 3831. Male, aged thirty-seven; no history of a previous pulmonary disease. Duration of illness, according to both physician and patient, six months.

Autopsy: Right pleura, glistening, transparent and pale, with no adhesions; no exudate. Right lung exceptionally good for a hospital case; a moderate grade of edema, a few isolated, gray to grayish-yellow tubercles about 1 mm. in diameter.

Record of physical examination: Right chest, anteriorly, slight depression above clavicle; expansion poor. Palpation, fremitus increased to second rib, absent below. No record of percussion. Vocal resonance, increased to second rib, absent below. Breathing, bronchovesicular to second rib, vesicular below. Posteriorly, inspection negative. Palpation, increased fremitus to spine of scapula, absent below. Percussion, slight dullness to spine of scapula, normal resonance to mid-scapula, hyperresonance below. Vocal resonance increased down to spine of scapula, absent below. Breathing, bronchovesicular down to spine of scapula, vesicular below.

Autopsy: Left pleura, upper lobe, glistening, transparent and pale, except at apex posteriorly to anterior axillary line, where there are dense adhesions. Pleura over lower lobe normal. Upper lobe of lung practically one large cavity, irregularly loculated, the largest compartment measuring 5 by 2 by 3 cm. Remainder of lobe, large caseous areas and congested lung tissue.

Record of physical examination: Left chest, anteriorly, expansion less than on right side. Palpation, fremitus increased above clavicle; diminished in first interspace; absent below. Percussion, tympany to second rib, marked dullness to fourth rib, slight dullness to fifth rib, normal note below. Vocal resonance, increased to fourth rib; absent below. Pectoriloquy to second rib. Breathing, blowing in character to second rib, bronchial, largely obscured by râles, to fourth rib, bronchovesicular below. Posteriorly, on inspection, chest negative. Palpation, fremitus increased to mid-scapula. Percussion,

tympany to spine of scapula, moderate dullness to mid-scapula; hyperresonance below. Vocal resonance, increased to mid-scapula, absent below. Breathing faint and blowing, obscured by râles as far down as the mid-scapula, bronchovesicular below.

Case No. 4462. Female, aged fifteen; history of pleurisy. Duration of illness, according to physician and patient, four months.

Autopsy: Right pleura, glistening, transparent and pale; no adhesions; no exudate. Right upper lobe, small cavity, 2 by 1 by 1.5 cm., at base of lobe posteriorly; throughout whole lobe equally distributed groups of coalesced tubercles with large areas of bronchopneumonia containing other groups of tubercles. Same condition in middle and lower lobes, except that there is no cavity formation. Note of pathologist: recent infection—less than two months.

Record of physical examination: Right chest, anteriorly, expansion fair. Palpation, fremitus increased to third rib; normal below. Vocal resonance: increased to second rib; normal below; no pectoriloquy. Breathing, bronchial to third rib, vesicular below; no râles. Posteriorly, on inspection, chest larger than on left. Palpation, fremitus increased throughout. Percussion, impairment in first interspace, resonance in second and third interspaces, dullness in fourth interspace. Vocal resonance increased throughout, no pectoriloquy. Breathing, bronchial expiration throughout; no râles.

Autopsy: Left pleura, densely adherent down to the fifth rib, below this normal. Left upper lobe, cavity in apex measuring 4 by 2 by 3 cm.; numerous small cavities scattered throughout remainder of lobe, the majority of which were filled with caseous dry material; great increase of connective tissue. Lower lobe, cavity in mid-axillary line, measuring 2.5 by 2 by 2.5 cm.; numerous smaller cavities throughout the remainder of the lobe; in other respects like upper lobe.

Record of physical examination: Left chest, anteriorly, expansion poor. Palpation, fremitus increased throughout. Percussion, tympany to third rib, impairment to sixth rib. Vocal resonance increased throughout; pectoriloquy in second, third, and fourth interspaces. Breathing cavernous to fourth rib; distant below; no râles. Posteriorly, on inspection, expansion poor. Palpation, fremitus increased throughout. Percussion, tympany in first interspace; impairment in second, third, and fourth interspaces. Vocal resonance, increased throughout. Pectoriloquy in first and second interspaces. Breathing, cavernous in first and second interspaces, bronchial in third and fourth interspaces.

Case No. 4735. Male, aged nineteen. Duration of illness, according to physician and patient, one year. Left-sided pyopneumothorax.

Autopsy: Right pleura, glistening, transparent and pale, with no adhesions and normal amount of exudate. Upper lobe, scattered groups of peribronchial tubercles throughout. Same condition in middle and lower lobes.

Record of physical examination: Right chest, anteriorly, depression above and below clavicle with diminished motion and retraction of interspaces. Palpation, fremitus increased down to third rib, normal below. Percussion, hyperresonance to third rib, normal below. Vocal resonance increased to second rib, normal below; pectoriloquy above clavicle. Breathing absent above clavicle; bronchial to third rib; vesicular below. Râles down as far as fourth rib. Posteriorly, on inspection, motion diminished; no record as to retraction. Palpation, fremitus normal to mid-scapula, absent below. Percussion, dullness to spine of scapula, hyperresonance to mid-scapula; dullness below. Vocal resonance normal throughout; no pectoriloquy. Breathing bronchial to spine of scapula, suppressed to mid-scapula, absent below; no râles.

W. B. STANTON.

COMPARISON OF THE PATHOLOGICAL FINDINGS WITH THE RECORDED CLINICAL SIGNS IN NINE CASES OF TUBERCULOSIS OF THE LUNGS.

This study was made in regard to the common physical signs, and, therefore, does not include the extraordinary signs suggested by some modern observers. In the Phipps Institute our idea was to learn first the common clinical signs in such a way that the opinions of the staff would be uniform; in other words, so that bronchial breathing or any other clinical sign would be the same to all. By comparison of these signs with the pathological condition found at autopsy, we hoped to make our knowledge definitely practical. This paper shows the pathological condition found at autopsy and the recorded clinical signs in nine of my cases. The signs here recorded are the ordinary ones of inspection, palpation, percussion, and auscultation.

Case No. 2019. Age, twenty-seven. Entered dispensary 1 : 22 : '04; entered hospital 8 : 15 : '05. Left hospital 3 : 27 : '06 improved. Readmitted to hospital 4 : 28 : '06. Last examination 8 : 20 : '06. Died 9 : 8 : '06. Clinical diagnosis, tuberculosis of lungs and right foot. Clinical diagnosis of lungs in detail: Left lung upper lobe infiltrated, no cavity; lower lobe, congestion and caseous bronchopneumonia. Right lung upper lobe infiltrated, no cavity; middle lobe, congestion and scattered tubercles; lower lobe, congestion, caseous bronchopneumonia, and scattered tubercles.

Left Pleura and Lung.—Autopsy: Upper lobe, pleura, adhesions along margin of costal cartilages to fourth rib, normal elsewhere. Lung, cavity, 7 x 5 cm., at apex posteriorly, some anthracosis, otherwise quite normal. Lower lobe, pleura, normal. Lung, small cavity about 1 cm. in diameter, location not stated, one large area of coalesced caseous tubercles, and areas of bronchopneumonia.

Clinical signs: Inspection anteriorly, depression above and below clavicle about the same on both sides, expansion good, development poor, nourishment pretty good. There is a definite deformity consisting of retraction of the sternum in its lower part. Posteriorly, no depression above or below spine of scapula, no winging of scapula. Percussion anteriorly, dullness from above clavicle to third rib, especially toward outer side, normal below; posteriorly, dullness above and immediately below spine of scapula, normal to angle of scapula, impairment below. Auscultation, breathing anteriorly, bronchial above and below clavicle, elsewhere masked by coarse moist and bubbling râles; posteriorly, bronchovesicular above spine of scapula, below inspiration masked by moist râles, expiration normal. Râles anteriorly, coarse moist and bubbling everywhere; posteriorly, moist everywhere. Whispering pectoriloquy, anteriorly and posteriorly absent. Vocal resonance, increased anteriorly to second rib, normal below; increased posteriorly above spine of scapula, normal below. Palpation, tactile fremitus anteriorly and posteriorly, normal everywhere.

Right Pleura and Lung.—Autopsy: Upper lobe, pleura, obliterated. Lung, small calcified cavity with thickened walls ¾ cm. in diameter at apex posteriorly, elsewhere bronchopneumonia. The cavity here mentioned was not a cavity in the clinical sense, as it was filled with calcified material. Middle lobe, pleura, obliterated. Lung, areas of coalesced tubercles. Lower lobe, pleura, obliterated. Lung, areas of coalesced tubercles and bronchopneumonia.

Clinical signs: Inspection anteriorly, depression above and below clavicle, expansion good, development pretty good, nourishment pretty good, chest generally flat; posteriorly, no depression above or below spine of scapula, no winging of scapula. Percussion anteriorly, dullness to second rib, normal below, except between third and fifth ribs and sternal and midclavicular lines which is dull; posteriorly, dullness over upper lobe, normal at angle of scapula, impairment below angle of scapula. Auscultation, breathing anteriorly, bronchovesicular above and below clavicle, below masked by râles; posteriorly, bronchovesicular over upper lobe, below masked by râles. Râles anteriorly and posteriorly fine moist. Whispering pectoriloquy, anteriorly and posteriorly absent. Vocal resonance anteriorly, normal; posteriorly, increased everywhere. Palpation, tactile fremitus anteriorly and posteriorly, normal.

Case No. 2980. Age, thirty-two. Black. Entered dispensary 12 : 14 : '04; entered hospital 5 : 1 : '05. Left hospital 10 : 23 : '05. Readmitted to hospital 2 : 12 : '06. Last examination 2 : 12 : '06. Died 2 : 24 : '06. Clinical diagnosis, tuberculosis of lungs. Clinical diagnosis of lungs in detail: Left lung upper lobe, large cavity near anterior surface with some infiltration

below; lower lobe, compensatory emphysema and numerous scattered tubercles. Right lung upper lobe, small cavities surrounded by infiltration; middle and lower lobes, partially infiltrated.

Left Pleura and Lung.—Autopsy: Upper lobe, pleura, firm adhesions down to third rib, recent to fifth rib. Lung, cavity 2 cm. in its largest diameter, 2 cm. below extreme apex, posteriorly a cavity 4 x 2 x 7 cm. Remainder of lobe consolidated by coalesced miliary tubercles. Lower lobe, pleura, diaphragmatic surface firm adhesions, elsewhere but few adhesions. Lung, at extreme apex, at root, and at base posteriorly consolidated areas made up of coalesced caseous tubercles, remainder of lobe, congestion and a few isolated miliary tubercles.

Clinical signs: Inspection anteriorly, depression above and below clavicle, though less than on right, chest somewhat flat, nourishment pretty good, development good, expansion poor; posteriorly, slight depression above and below spine of scapula, no winging of scapula. Percussion anteriorly, tympany to third rib, impairment to fifth rib, hyperresonance below; posteriorly, tympany above spine of scapula, hyperresonance below. Auscultation, breathing anteriorly, above clavicle cavernous, from clavicle to sixth rib amphoric, below not recorded; posteriorly, above and below spine of scapula bronchial, below masked by râles on inspiration and expiration. Râles anteriorly and posteriorly, moist on inspiration and expiration everywhere. Whispering pectoriloquy anteriorly, exquisite to fourth rib, present to fifth rib, absent below; posteriorly, present above spine of scapula, absent below. Vocal resonance anteriorly, bronchophony to fourth rib, increased to sixth rib, normal below; posteriorly, increased above spine of scapula, normal below. Palpation, tactile fremitus anteriorly and posteriorly, normal everywhere.

Right Pleura and Lung.—Autopsy: Upper lobe, pleura, total obliteration. Lung, cavity, 2 cm. in diameter at posterior lateral aspect of apex and another of the same size at base of lobe; at extreme apex a caseous, firm, circumscribed, somewhat encapsulated area; increase in fibrous tissue throughout lobe. Middle lobe, pleura, obliterated. Lung, slight edema and congestion, no visible tubercles, no cavities. Lower lobe, pleura, obliterated. Lung, congestion and at base posteriorly areas of coalesced tubercles and one small cavity.

Clinical signs: Inspection anteriorly, depression above and below clavicle greater than on left, chest somewhat flat, nourishment pretty good, expansion poor, development good; posteriorly, depression above and below spine of scapula, no winging of scapula. Percussion anteriorly, tympany from above clavicle to second rib, impairment below to normal liver dullness; posteriorly,

tympany above spine of scapula, dullness over rest of upper lobe, impairment below. Auscultation, breathing anteriorly, cavernous from above clavicle to second rib, bronchial from second to fifth rib, bronchovesicular below; posteriorly, cavernous above spine of scapula, bronchial below. There was a definite friction rub anteriorly from fourth to seventh rib, and posteriorly from fifth to ninth rib. Râles anteriorly and posteriorly, moist on inspiration and expiration and in addition at base posteriorly sticky crackles. Whispering pectoriloquy anteriorly, present to second rib, absent below; posteriorly, present above spine of scapula, absent below. Vocal resonance anteriorly, bronchophony to second rib, increased to fifth rib, normal below; posteriorly, increased above spine of scapula, normal to ninth rib, and diminished below Palpation, tactile fremitus anteriorly, normal; posteriorly, normal to seventh rib, diminished below.

Case No. 3548. Age, nineteen. Entered hospital 12 : 20 : '05. Last examination 2 : 2 : '06. Died 2 : 12 : '06. Clinical diagnosis, tuberculosis of lungs, pleura, intestines, larynx, and both middle ears. Clinical diagnosis of lungs in detail: Left lung, upper lobe two cavities on first examination which gradually became one large loculated cavity, infiltration below; lower lobe compensatory emphysema and scattered tubercles. Right lung, upper lobe one large cavity with infiltration below; middle lobe, infiltration and cavity; lower lobe compensatory emphysema and scattered tubercles.

Left Pleura and Lung.—Autopsy: Upper lobe, pleura, dense adhesions everywhere. Lung, two large cavities, one irregularly loculated, both measuring 5 x 2½ x 7 cm., and numerous small ones varying from 1 to 2 cm. in diameter; the whole series of cavities formed a chain four inches long by two inches wide. Lower lobe, pleura, adhesions everywhere. Lung, cavity in anterior upper part measuring 4 x 4 x 4 cm.; in lower part a wedge-shaped area of caseous pneumonia, anteriorly at base congestion and a few isolated miliary tubercles.

Clinical signs: Inspection anteriorly, depression above and below clavicle not so great as on right, chest generally flat, expansion good, nourishment poor, development poor; posteriorly, depression above and below spine of scapula, no winging of scapula. Percussion anteriorly, typical tympany above clavicle to third rib, dullness from third to fifth rib, hyperresonance below; posteriorly, typical tympany above and below spine of scapula, dullness over rest of upper lobe, hyperresonance to angle of scapula, impairment to base with some underlying hyperresonance. Auscultation, breathing anteriorly, cavernous from above clavicle to third rib, bronchial from third to sixth rib, bronchovesicular to seventh interspace; posteriorly, cavernous above and below

spine of scapula, bronchial to base of lung. Râles anteriorly, moist on inspiration and expiration, and in addition a musical râle on expiration everywhere; posteriorly, fine moist above spine of scapula, a few moist over rest of lung. Whispering pectoriloquy anteriorly, present from above clavicle to fourth rib, two varieties, one extending to second rib, and another between third and fourth ribs; posteriorly, marked above and below spine of scapula. Vocal resonance anteriorly, bronchophony to fourth rib in two varieties, one extending to second and one between third and fourth ribs; posteriorly, bronchophony above and below spine of scapula, normal below. Palpation, tactile fremitus anteriorly, increased everywhere; posteriorly, normal.

Right Pleura and Lung.—Autopsy: Upper lobe, pleura, dense adhesions everywhere. Lung, large, very superficial cavity, measuring 6 x 4 x 3 cm., and small communicating cavities communicating with it; remainder of lobe consolidation and caseous areas. Middle lobe, pleura, dense adhesions everywhere. Lung, cavity measuring 5 x 2½ x 2 cm. in anterior part a little to sternal side of midclavicular line; remainder of lobe shows dilated bronchi, areas of caseation, and increase in fibrous tissue; the whole lobe is practically solidified. Lower lobe, pleura, dense adhesions everywhere. Lung, posteriorly at apex small honeycombing cavities which communicate with cavity in upper lobe; in anterior part of lobe groups of coalesced tubercles between which is air-bearing though congested tissue.

Clinical signs: Inspection anteriorly, depression above and below clavicle more marked than on left, right chest generally flat and broader than left, expansion good, development good, nourishment poor; posteriorly, depression above and below spine of scapula, no winging of scapula. Percussion anteriorly, typical tympany from above clavicle to third rib, dullness from third to fifth rib, hyperresonance with a slight tympanitic quality from fifth rib to seventh interspace; posteriorly, tympany from above spine to almost angle of scapula, hyperresonance below. Auscultation, breathing anteriorly, cavernous from above clavicle to third interspace, below inspiration and expiration masked by coarse moist râles; posteriorly, breathing cavernous almost down to angle of scapula, at angle of scapula bronchial, below inspiration and expiration masked by coarse moist râles. Râles anteriorly, coarse moist everywhere; posteriorly, none to almost angle of scapula, then moist to base. Whispering pectoriloquy anteriorly, present to fourth rib; posteriorly, present to almost angle of scapula, absent below. Vocal resonance anteriorly, bronchophony to third rib, increased to sixth rib, normal to seventh rib; posteriorly, bronchophony to below spine of scapula, increased to base. Palpation, tactile fremitus anteriorly, increased everywhere; posteriorly, increased to below angle of scapula, diminished below.

Case No. 3896. Age, twenty-seven. Entered hospital 1 : 31 : '06. Last examination 2 : 9 : '06. Died 2 : 10 : '06. Clinical diagnosis, tuberculosis of lungs. Clinical diagnosis of lungs in detail: Left lung, infiltration of upper half of upper lobe, compensatory emphysema of lower lobe. Right lung, large cavity with infiltration taking up the whole of upper lobe, middle and lower lobes compensatory emphysema. Several days preceding death there developed what appeared to be a bronchopneumonia over right lower lobe.

Left Pleura and Lung.—Autopsy: Upper lobe, pleura, scattered firm adhesions. Lung, one small 0.5 cm. old healed lesion with calcified and caseous center and sharply circumscribed border; remainder practically normal with exception of slight edema and a few isolated pin-point tubercles. Lower lobe, pleura, normal. Lung, a few scattered miliary tubercles.

Clinical signs: Inspection anteriorly, depression above and below clavicle less than on right, expansion good, nourishment good, development good; posteriorly, no depression above or below spine of scapula, no winging of scapula. Percussion anteriorly, impairment from above clavicle to fourth rib, hyperresonance below; posteriorly, impairment above spine of scapula, normal below. Auscultation, breathing anteriorly, bronchial everywhere; posteriorly, bronchovesicular, almost bronchial, everywhere. Râles anteriorly and posteriorly, none. Whispering pectoriloquy anteriorly and posteriorly, absent. Vocal resonance anteriorly, everywhere normal; posteriorly, everywhere increased. Palpation, tactile fremitus anteriorly and posteriorly, normal.

Right Pleura and Lung.—Autopsy: Upper lobe, pleura, adhesions at apex, elsewhere normal. Lung, several small cavities, one about 0.5 cm. in its greatest diameter about 3 cm. from apex in midclavicular line, two to sternal side of midclavicular line measuring 1.5 x 0.5 x 1 cm., three about 0.5 cm. in diameter in midclavicular line posteriorly; remainder of lobe edema and grayish pneumonic consolidation. The whole lobe is involved. Middle lobe, pleura, normal. Lung, consolidated similarly to upper lobe, no cavity. Lower lobe, pleura, normal. Lung, consolidated similarly to other lobes, no cavity.

Clinical signs: Inspection anteriorly, depression above and below clavicle greater than on left, chest generally flat; expansion poor, development good, nourishment good; posteriorly, no depression above or below spine of scapula, no winging of scapula. Percussion anteriorly, typical tympany from above clavicle to third rib, hyperresonance to liver dullness, which is normal; posteriorly, typical tympany above spine of scapula, dullness below spine of scapula, impairment over rest of upper lobe, hyperresonance from angle of scapula to base. Auscultation, breathing anteriorly, cavernous from above

clavicle to second rib, bronchial from second to fourth rib, bronchovesicular from fourth to seventh rib; posteriorly, distant bronchovesicular above spine of scapula, below bronchovesicular to base. Râles anteriorly, a few moist above clavicle, none elsewhere anteriorly or posteriorly. Whispering pectoriloquy anteriorly, present from above clavicle to second rib; posteriorly, present above spine of scapula, absent elsewhere. Vocal resonance anteriorly, bronchophony from above clavicle to second rib, increased from second to third rib, normal below; posteriorly, increased everywhere. Palpation, tactile fremitus anteriorly and posteriorly, normal.

Case No. 4148. Age, thirty-two. Entered hospital 5 : 22 : '06. Last examination 6 : 18 : '06. Died 7 : 1 : '06. Clinical diagnosis, tuberculosis of lungs, of larynx, hypernephroma of left kidney. Clinical diagnosis of lungs in detail: Left lung, large cavity in the upper part of the upper lobe with infiltration of rest of upper lobe, scattered tubercles throughout lower lobe. Right lung, infiltration of upper lobe, middle lobe partially infiltrated, lower lobe emphysematous.

Left Pleura and Lung.—Autopsy: Upper lobe, pleura, normal except anteriorly along third and fourth ribs and posteriorly from axillary line over whole lobe where there are adhesions. Lung, riddled with large and small cavities practically involving the whole lobe, the large cavities being at apex. Lower lobe, pleura, no adhesions anteriorly, adhesions everywhere posteriorly. Lung, upper half, one small cavity in the middle of the posterior part and another not located about 1.5 cm. in diameter; elsewhere numerous groups of caseous coalesced tubercles and congestion.

Clinical signs: Inspection anteriorly, depression above clavicle, but not so great as on right, no depression below clavicle, development good, nourishment pretty good, expansion good; posteriorly, depression above and below spine of scapula greater than on right, winging of scapula. Percussion anteriorly, tympany above and below clavicle to second rib, dullness from second to third rib, impairment from third to fourth rib, hyperresonance from fourth to seventh rib and below dullness from tumor of left kidney; posteriorly, dull tympany above spine of scapula, dullness over rest of upper lobe, normal to ninth rib, dullness below ninth rib due to tumor of left kidney. Auscultation, breathing anteriorly, amphoric to second rib, tubular from second to third rib, bronchial from third to fourth rib, and below breathing masked by râles; posteriorly, bronchial, almost cavernous above spine of scapula, normal below. Râles anteriorly, coarse moist on inspiration everywhere; posteriorly, none. Whispering pectoriloquy anteriorly, present to second rib and posteriorly over spine of scapula, elsewhere absent. Vocal resonance an-

teriorly, increased to second rib and posteriorly over spine of scapula, normal elsewhere. Palpation, tactile fremitus anteriorly, increased to second rib; posteriorly, increased over spine of scapula, normal elsewhere.

Right Pleura and Lung.—Autopsy: Upper lobe, pleura anteriorly, adhesions along course of third rib; posteriorly, dense adhesions at apex with recent adhesions below. Lung, large cavity 6 x 5 x 4 cm. filling whole apex, especially posteriorly, elsewhere numerous 1 to 2 cm. circumscribed caseous tubercles; the anterior part of lobe showed most marked involvement. Middle lobe, pleura, normal. Lung, whole anterior part consolidated by coalesced caseous tubercles, elsewhere isolated groups of tubercles and congestion. Lower lobe, pleura anteriorly, normal; posteriorly, recent adhesions. Lung, similar to middle lobe though not so much involved; posterior part showed less involvement than elsewhere.

Clinical signs: Inspection anteriorly, depression above and below clavicle more than on left, development good, nourishment pretty good, expansion good; posteriorly, depression above and below spine of scapula, no winging of scapula. Percussion anteriorly, dull to second rib, impaired from second to third rib, hyperresonance from third to seventh rib, in anterior axillary line and to fifth rib in midclavicular line, and dull from third rib to liver dullness for two inches outside sternal line; posteriorly, impairment above and below spine of scapula, normal below. Auscultation, breathing anteriorly, bronchial to second rib, bronchovesicular from second to third rib, normal to sixth rib, absent below; posteriorly, normal everywhere. Râles anteriorly and posteriorly, none. Whispering pectoriloquy anteriorly and posteriorly, absent. Vocal resonance anteriorly and posteriorly, normal. Palpation, tactile fremitus anteriorly and posteriorly, normal.

Case No. 4197. Age, thirty. Entered dispensary 6 : 4 : '06; entered hospital 9 : 17 : '06. Last examination 9 : 19 : '06. Died 10 : 3 : '06. Clinical diagnosis, tuberculosis of lungs. Clinical diagnosis of lungs in detail: Left upper lobe apex fibrous, immediately below apex to outer side, several small cavities, to inner side small amount of slightly emphysematous lung tissue. Acute consolidation of lower part of upper lobe and upper part of lower lobe scattered tubercles throughout lower lobe. Right upper lobe cavity in upper part, infiltration below. Middle and lower lobes scattered tubercles.

Left Pleura and Lung.—Autopsy: Upper lobe, pleura, thickened to third rib; recent adhesions anteriorly and dense posteriorly. Lung, consolidated and of grayish-yellow color; several small cavities filled with thick pus in anterior part, small area of air-bearing tissue to sternal side of midclavicular line immediately below consolidated apex. Lower lobe, pleura, normal with

no adhesions and only a slight amount of clear fluid. Lung, upper half consolidated similarly to upper lobe; remainder contains small groups of caseous tubercles, lower part of lobe shows some air-bearing tissue with areas of coalesced tubercles.

Clinical signs: Inspection anteriorly, depression above clavicle, though not so great as on right, depression below clavicle slightly greater than on right. Left chest generally flat, nourishment poor, expansion generally poor; posteriorly, depression above and below spine of scapula, though not so great as on right, winging of scapula more marked than on right. Percussion anteriorly, dullness above clavicle, hyperresonance below clavicle to third rib from one inch outside parasternal line to midsternum, tympany below clavicle to third rib from one inch outside parasternal line to axillary line, dull tympany from third to fourth rib between area of heart dullness (which is normal) and axillary line, dullness from fourth to sixth rib, hyperresonance from sixth rib to seventh interspace, where stomach tympany begins; posteriorly, tympany above spine of scapula, dullness to sixth rib, in other words, over entire upper lobe and upper part of lower lobe, normal resonance below to base of lung. Auscultation, breathing anteriorly, above and below clavicle bronchial, almost cavernous, from second rib to fourth interspace cavernous, almost amphoric, below fourth interspace to base bronchial; posteriorly, bronchial from apex to base of lung. Râles anteriorly, none to second rib, metallic, coarse moist and bubbling from second rib to fourth interspace, below coarse moist to base; posteriorly, few moist râles over whole chest. Whispering pectoriloquy anteriorly, absent to second rib, marked from second rib to fourth interspace, none below; posteriorly, absent above and present immediately below spine of scapula (though very slight), none below. Vocal resonance anteriorly, increased to second rib, bronchophony from second to third rib, increased from third to fourth rib, normal below; posteriorly increased above, bronchophony immediately below spine of scapula, increased to angle of scapula, normal below. Palpation, tactile fremitus anteriorly, absent above clavicle, increased to sixth rib, normal below; posteriorly, normal all over chest.

Right Pleura and Lung.—Autopsy: Upper lobe, pleura, thickened and adherent from apex to second interspace. Lung, consolidation of grayish color and several very small cavities (0.5 to 1 cm. in diameter). Middle lobe, pleura, generally normal with adhesions along fifth rib. Lung, moderate infiltration with coalesced miliary tubercles of peribronchial type, about one-half lobe being involved. Lower lobe, pleura, normal, no adhesions, no exudate. Lung, similar to middle lobe the lesions being well distributed.

Clinical signs: Inspection anteriorly, depression above clavicle greater than on left, depression below clavicle less than on left, development pretty

good, nourishment poor, expansion poor; posteriorly, depression above and below spine of scapula greater than on left, slight winging of scapula less than on left. Percussion anteriorly, tympany above clavicle and to third interspace, hyperresonance to sixth rib in midaxillary line and to fourth interspace, near sternum, dullness along sternum to parasternal line; posteriorly, tympany above spine of scapula, dullness to sixth rib, normal below. Auscultation, breathing anteriorly, immediately above and below clavicle probably cavernous, though so masked by coarse moist and bubbling râles as to be difficult to describe, between second and third ribs cavernous, below third rib marked bronchial to sixth rib; posteriorly, from apex to base bronchial. Râles anteriorly, coarse moist and bubbling to third interspace, coarse moist to sixth rib; posteriorly, few coarse moist to sixth rib, none below. Whispering pectoriloquy anteriorly, present to third rib, none below; posteriorly, present above and below spine of scapula, none below. Vocal resonance anteriorly, bronchophony to third interspace, increased to fourth interspace, normal to sixth rib; posteriorly, increased above spine of scapula to sixth rib, normal below. Palpation, tactile fremitus anteriorly, absent above clavicle, increased to fifth rib, normal to sixth rib; posteriorly, increased above spine of scapula, normal below.

Case No. 4224. Age, thirty-four. Entered dispensary 6 : 13 : '06; entered hospital 7 : 3 : '06. Last examination 10 : 14 : '06. Died 10 : 17 : '06. Clinical diagnosis, tuberculosis of lungs and intestines; obliteration of right pleura, probable amyloid liver. Clinical diagnosis of lungs in detail: Left upper lobe, infiltration, lower lobe scattered tubercles everywhere. Right upper lobe, infiltration, middle and lower lobes, scattered tubercles; probable cavity at right apex, though signs very vague.

Left Pleura and Lung.—Autopsy: Upper lobe, pleura, thickened with dense adhesions to fourth rib. Lung, cavity at extreme apex posteriorly, 2 x 2 x 6 cm. running diagonally from apex toward shoulder, cavity at base of upper lobe measuring 3 x 2.5 x 1 cm. to the outer side of midclavicular line, cavity in middle of lobe posteriorly 1 x 1 x 2 cm. All cavities old and partly filled with fluid muco-pus. Remainder of upper lobe consolidated by large caseous and gray pneumonic areas. Lower lobe, pleura, normal, no adhesions. Lung, upper one-third consolidated similarly to upper lobe, lower half of lobe isolated and small groups of caseous nodules, about one-half of lobe involved.

Clinical signs: Inspection anteriorly, depression above and below clavicle, but not so great as on right side, development good, nourishment poor, expansion pretty good, left chest considerably larger than right. Retraction of

interspaces from fifth to eighth anteriorly. Posteriorly, slight depression above and below spine of scapula, no winging of scapula. Percussion anteriorly, dullness above clavicle and below clavicle to second rib from one inch outside parasternal line to axillary line, superficial impairment with slight hyperresonance on deep percussion from clavicle to third rib and from sternum to one inch outside parasternal line and between second and third ribs outside this area; dullness between third and fourth ribs, hyperresonance below; posteriorly, dullness above spine of scapula, normal below. Auscultation, breathing anteriorly, masked by coarse moist râles over whole chest anteriorly and posteriorly, except above spine of scapula, where bronchovesicular. Râles anteriorly and posteriorly, coarse moist over whole chest. Whispering pectoriloquy anteriorly and posteriorly, absent everywhere. Vocal resonance anteriorly, increased to third rib, normal below; posteriorly, slight increase above spine of scapula, normal below. Palpation, tactile fremitus anteriorly, increased from clavicle to third rib, normal elsewhere; posteriorly, normal.

Right Pleura and Lung.—Autopsy: Upper lobe, pleura, normal with exception of one small adhesion posteriorly 4 cm. below extreme apex. Lung, infiltrated with miliary tubercles uniformly distributed. The extreme apex shows a hardened nodule about 2 x 1 cm. in extent, but process is recent. Middle lobe, pleura normal. Lung, scattered tubercles as in other lobes, though not quite so many. Lower lobe, pleura, normal, no exudate. Lung, scattered tubercles as in other lobes.

Clinical signs: Inspection anteriorly, depression above and below clavicle greater than on left, development good, nourishment poor, expansion pretty good, but not so good as on left. Retraction of all interspaces anteriorly. Posteriorly, slight depression above and below spine of scapula, no winging of scapula. Percussion anteriorly, dullness above clavicle and below clavicle to second rib, from one inch outside parasternal line to axillary line, impairment from second to third rib from midclavicular line to axillary line; dullness from third to fourth rib from midclavicular line to axillary line, hyperresonance elsewhere to seventh rib in the midaxillary line and to fourth interspace near sternum, where liver seems to begin; posteriorly, dullness above and below spine of scapula to fifth rib, normal below. Auscultation, breathing anteriorly, exaggerated bronchial to second interspace, bronchial to third interspace, bronchovesicular below; posteriorly, distant bronchial above spine of scapula, bronchial to base of lung. Râles anteriorly, coarse moist to third interspace, below and posteriorly, none. Whispering pectoriloquy anteriorly and posteriorly, absent. Vocal resonance anteriorly, increased to third interspace, normal below; posteriorly, slightly increased above spine of scapula, normal below. Palpation, tactile fremitus anteriorly, normal above clavicle,

increased to third rib, normal below; posteriorly, slightly increased above spine of scapula, normal below.

Case No. 4232. Age, forty. Entered dispensary 6 : 16 : '06; entered hospital 6 : 27 : '06. Last examination 10 : 17 : '06. Died 11 : 10 : '06. Clinical diagnosis, tuberculosis of lungs, intestines, obliteration of right pleura. Clinical diagnosis of lungs in detail: Left lung upper lobe cavity surrounded by infiltration with some quite healthy lung tissue between clavicle and third rib near sternum, lower half of upper lobe congestion and scattered consolidation; lower lobe compensatory emphysema. Right lung upper lobe series of small cavities with a large old one at apex; middle lobe consolidation; lower lobe some consolidation and a cavity near apex.

Left Pleura and Lung.—Autopsy: Upper lobe, pleura, thickened to third rib anteriorly and to second rib posteriorly with recent and old adhesions. Lung, small cavities in upper middle part of lobe 2 x 1 x 1 cm., 9 cm. below apex and about 1 cm. below anterior surface of lung with consolidated lung tissue between; large cavity at apex measuring 7 x 7 x 4 cm., apex of cavity being posteriorly, the cavity itself curving down and around to anterior surface in an S-shape with a block of consolidated lung tissue to lateral part of apex; remainder of lobe showed grayish-yellow caseous consolidation and edema. Lower lobe, pleura, normal, no adhesions, and only a slight amount of clear fluid. Lung, central part area of consolidation made up of coalesced caseous tubercles and grayish pneumonic infiltration; remainder of lobe congestion and diffuse areas of coalesced tubercles. The lung was more consolidated anteriorly than posteriorly and showed about one-quarter involvement.

Clinical signs: Inspection anteriorly, depression above and below clavicle, though not so great as on right, development good, nourishment poor, expansion good; posteriorly, depression above spine of scapula, none below, no winging of scapula. Percussion anteriorly, tympany above clavicle to second rib near sternum and to third rib outside midclavicular line; hyperresonance between second and third ribs, between midclavicular line and sternum; dullness from third to fourth rib, hyperresonance below; posteriorly, tympany above spine of scapula, impairment over rest of upper lobe, hyperresonance below. Auscultation, breathing anteriorly, cavernous to second rib, bronchovesicular to base of lung; posteriorly, bronchial almost cavernous above spine of scapula, bronchial immediately below spine, bronchovesicular below. Râles anteriorly and posteriorly, none. Whispering pectoriloquy anteriorly, present to second rib, absent below; posteriorly, present above spine of scapula, absent below. Vocal resonance anteriorly, increased to second rib, normal below; posteriorly, increased above spine of scapula, normal below. Palpa-

tion, tactile fremitus anteriorly, absent above clavicle, normal below; posteriorly, normal everywhere.

Right Pleura and Lung.—Autopsy: Upper lobe, pleura, thickened, adhesions everywhere. Lung, upper two-thirds consists of a large cavity with comparatively smooth walls; small amount of normal lung tissue at root of lung; lower third shows caseation and consolidation with cavity in anterior part communicating with cavity in middle lobe. Middle lobe, pleura, thickened, adhesions everywhere. Lung, anterior part between sternum and midclavicular line contained several large communicating cavities with irregular walls partly filled with muco-pus. The cavities were old, the walls showed old membrane. These cavities in the middle lobe were in such a situation that they might be readily filled and prove difficult to empty. The upper cavity communicated with the large cavity in upper lobe. Elsewhere the lobe showed an acute pneumonic and old caseous consolidation. Lower lobe, pleura, thickened, adhesions everywhere. Lung, several small cavities about center of lobe, remainder of lobe showed pneumonic consolidation of acute type and areas of old caseation.

Clinical signs: Inspection anteriorly, depression above and below clavicle greater than on left; posteriorly, depression above and below spine of scapula greater than on left, no winging of scapula. Percussion anteriorly, absolute tympany to second rib, tympany with slight hyperresonant quality to fourth rib, dullness from fourth to fifth rib between sternum and midclavicular line, hyperresonance from fourth to seventh rib in midaxillary line; posteriorly, tympany above and below spine of scapula, dullness over rest of lung except an area about two inches square, immediately over angle of scapula, where there is tympany. Auscultation, breathing anteriorly, absent above clavicle, cavernous to second rib, amphoric from second to fourth rib and from sternum to midclavicular line, a combination of tubular and amphoric from fourth to sixth rib, absent below; posteriorly, cavernous above spine of scapula, though so masked by râles as to be somewhat indefinite, absolutely masked by râles from spine of scapula to fifth rib, exquisite amphoric from sixth rib to base. Râles anteriorly, a few metallic râles from above clavicle to sixth rib, coarse moist and bubbling on inspiration below; posteriorly, coarse sticky crackles on inspiration and expiration above spine of scapula and to sixth rib, metallic crackles on inspiration and expiration from sixth rib to base. Whispering pectoriloquy anteriorly, absent above clavicle, increased to third rib, exquisite to sixth rib; posteriorly, absent above and below spine of scapula, exquisite from sixth rib to base. Vocal resonance anteriorly, absent above clavicle, bronchophony immediately below clavicle, increased from second to third rib, bronchophony from third rib to base; posteriorly, increased to sixth rib,

bronchophony from sixth rib to base. Palpation, tactile fremitus anteriorly, absent above clavicle, increased to fifth rib, normal below; posteriorly, increased everywhere.

Case No. 4243. Age, thirty-two. Entered hospital 6 : 22 : '06. Last examination 6 : 23 : '06. Died 6 : 25 : '06. Clinical diagnosis, tuberculosis of lungs, acute tuberculous pneumonia of left upper lobe.

Left Pleura and Lung.—Autopsy: Upper lobe, pleura, thickened, adhesions everywhere. Lung, practically whole lobe consolidated and of grayish-red color. Cavity about 8 cm. below extreme apex and about junction of anterior axillary line with fourth rib, the cavity is old, filled with blood and surrounded by considerable fibrous tissue, recent pneumonic infiltration and anthracosis. Lower lobe, pleura, normal, no adhesions. Lung, anterior part consolidated similarly to upper lobe, a few scattered very small grayish tubercles; anthracosis.

Clinical signs: Inspection anteriorly, no depression above or below clavicle, expansion good, nourishment good, development good; posteriorly, slight depression above spine of scapula, no depression below, no winging of scapula. Percussion anteriorly, normal to second rib, dullness from second to fourth rib, normal below; posteriorly, normal everywhere. Auscultation, breathing anteriorly, so muffled over upper lobe that it was not defined any place anteriorly; posteriorly, bronchovesicular everywhere. Râles anteriorly, crepitant from second to fourth ribs; posteriorly, none. Whispering pectoriloquy anteriorly and posteriorly, absent. Vocal resonance anteriorly and posteriorly, normal. Palpation, tactile fremitus anteriorly, not recorded; posteriorly, normal.

Right Pleura and Lung.—Autopsy: Upper lobe, pleura, normal, no adhesions. Lung, whole upper lobe distinctly congested, areas of pneumonia, several isolated tubercles and anthracosis. At base of lobe posteriorly an area of pneumonic consolidation about 3 cm. in diameter. Middle lobe, pleura, normal. Lung, generally same as upper lobe, congested and a small pneumonic area in its upper part. Lower lobe, pleura, normal. Lung, congested same as upper and middle lobes, with a pneumonic area at apex posteriorly.

Clinical signs: Inspection anteriorly, depression above and below clavicle, expansion good, nourishment good, development good; posteriorly, slight depression above spine of scapula, no depression below, no winging of scapula. Percussion anteriorly, impairment to third rib, normal below; posteriorly, normal everywhere. Auscultation, breathing anteriorly, to third rib somewhat asthmatic in type with long-drawn-out dry squeaks, palpable as well as audible, normal below; posteriorly, bronchovesicular everywhere. Râles anteriorly and

posteriorly, none. Whispering pectoriloquy anteriorly and posteriorly, absent. Vocal resonance anteriorly and posteriorly, normal. Palpation, tactile fremitus anteriorly, not recorded; posteriorly, normal.

CAVITIES IN THE UPPER HALF OF THE UPPER LOBES.

ONE LARGE CAVITY (2 CM. OR OVER).

Case No.	Lung.	Number of Days Before Death Examination Made.	Percussion Note.	Breathing.	Râles.	Whispering Pectoriloquy.	Vocal Resonance.	Tactile Fremitus.
2019.	Left.	19	Dullness.	Masked by râles.	Coarse moist and bubbling.	o	+	N
2980.	Left.	12	Typical tympany.	Cavernous.	Moist.	++	++	N
2980.	Right.	12	Tympany.	Cavernous.	Moist.	+	++	N
3548.	Left.	10	Typical tympany.	Cavernous.	Moist.	+	++	+
3548.	Right.	10	Typical tympany.	Cavernous.	Coarse moist.	+	++	+
4148.	Left.	13	Tympany.	Cavernous.	Coarse moist.	+	+	+
4148.	Right.	13	Dullness.	Bronchial.	o	o	N	N
4224.	Left.	3	Dullness.	Masked by râles.	Coarse moist.	o	+	+
4232.	Right.	24	Typical tympany.	Cavernous.	Metallic.	++	++	+

ONE LARGE AND SEVERAL SMALL CAVITIES.

4232.	Left.	24	Typical tympany.	Cavernous.	o	+	+	—

SEVERAL SMALL CAVITIES.

3896.	Right.	1	Typical tympany.	Cavernous.	Moist.	+	++	N
4197.	Left.	14	Tympany.	Cavernous.	Metallic coarse moist and bubbling.	+	++	+
4197.	Right.	14	Tympany.	Cavernous.	Coarse moist and bubbling.	+	++	+

+ signifies present or increased; ++, greatly increased, in the case of vocal resonance bronchophony, in the case of whispering pectoriloquy exquisite whispering pectoriloquy; —, diminished; o, absent; N, normal; N. R., not recorded.

Though the number of cases is too small from which to draw conclusions in regard to the comparison of the various pathological conditions and the clinical signs, tables have been made

showing this comparison, and it is hoped that conclusions will be possible after the accumulation of these tables in future reports.

The tables show the physical signs found in connection with the various pathological conditions in the different parts of the lungs, namely, the physical signs in connection with large and small cavities in the upper half of the upper lobe, in the lower half of the upper lobe, in the middle lobe, and in the lower lobe; also the physical signs in connection with large and small areas of consolidation, etc. In this series of cases there was no case of extensive consolidation like acute lobar pneumonia.

In the original copy of this paper I made rather extensive comments on the different tables, which on second thought I have omitted. A few comments have been left in connection with the tables on cavities, but none in connection with other pathological findings, on account of the small number of them.

In the ten lungs showing a large cavity in the upper part of the upper lobe, the percussion note was tympanitic seven times and dull three times; the breathing was cavernous seven times, masked by râles twice, and bronchial once; there were moist râles three times, coarse moist three times, coarse moist and bubbling once, metallic once, and no râles twice; there was exquisite whispering pectoriloquy twice, whispering pectoriloquy five times, and no whispering pectoriloquy three times; there was bronchophony five times, increased vocal resonance four times, and normal vocal resonance once; there was increased tactile fremitus five times, normal tactile fremitus four times, and diminished tactile fremitus once.

In these cases, therefore, the signs ordinarily recognized as those of cavity formation stand out most prominently, namely, tympany, cavernous breathing, moist, bubbling or metallic râles, whispering pectoriloquy, increased vocal resonance, and increased tactile fremitus.

The three lungs with cavity formation showing dullness on percussion gave no cavernous breathing (the breathing being

masked by râles twice and being bronchial once, this last showing no râles), no whispering pectoriloquy, increased vocal resonance twice, normal vocal resonance once, increased tactile fremitus once, normal tactile fremitus twice. There are reasons, from the appearance at autopsy, to believe that the cavities in these three cases might have been filled at the time of examination, hence it is possible that at the time of examination there were no cavities in these cases.

The three lungs with small cavities in the upper half of the upper lobe showed tympany in all, cavernous breathing in all, moist râles in all, metallic râles once, whispering pectoriloquy in all, bronchophony in all, and increased tactile fremitus twice.

CAVITIES IN LOWER HALF OF UPPER LOBE.

ONE LARGE CAVITY (2 CM. OR OVER).

Case No.	Lung.	Number of Days Before Death Examination Made.	Percussion Note.	Breathing.	Râles.	Whispering Pectoriloquy.	Vocal Resonance.	Tactile Fremitus.
3548.	Right.	10	Tympany.	Bronchial.	Coarse moist	+	++	+
4232.	Right.	24	Tympany.	Amphoric.	Metallic and coarse moist.	++	++	+
2980.	Right.	12	Impairment.	Bronchial.	Moist.	o	+	+

ONE LARGE AND ONE SMALL CAVITY.

4224.	Left.	3	Dullness.	Masked by râles.	Coarse moist.	o	N	N

SEVERAL SMALL CAVITIES.

3548.	Left.	10	Tympany.	Cavernous.	Moist.	+	++	+
4148.	Left.	13	Dullness.	Tubular.	Coarse moist.	o	N	N

Cavities in the lower half of the upper lobe were determined by the signs between the second and the sixth ribs on the left and the second and the fourth ribs on the right side. Taking all six cavities together found in this situation post-mortem, three showed tympany, one impairment, and two dullness; one showed amphoric breathing, one cavernous, one tubular, two bronchial, and in one the breathing was masked by râles; one showed

metallic râles, five moist râles; three showed whispering pectoriloquy; three showed bronchophony, one increased vocal resonance, and two normal vocal resonance; four showed increased tactile fremitus; and two normal tactile fremitus.

CAVITY IN RIGHT MIDDLE LOBE.

Case No.	Number of Days Before Death Examination Made.	Percussion Note.	Breathing.	Râles.	Whispering Pectoriloquy.	Vocal Resonance.	Tactile Fremitus.
3548.	10	Dullness.	Masked by coarse moist râles.	Coarse moist.	o	+	+

CAVITIES IN LOWER LOBES.

ONE LARGE CAVITY (2 CM. OR OVER).

Case No.	Lung.	Number of Days Before Death Examination Made.	Percussion Note.	Breathing.	Râles.	Whispering Pectoriloquy.	Vocal Resonance.	Tactile Fremitus.
3548.	Left.	10	Dullness.	Bronchial.	Moist.	o	N	+
3548.	Right.	10	Tympany.	Cavernous.	o	+	++	+
4232.	Right.	24	Tympany.	Amphoric.	Metallic crackles.	++	++	+
SMALL CAVITIES.								
2019.	Left.	19	Impairment.	Inspiration masked by moist râles, expiration normal.	Coarse moist and bubbling.	o	N	N
4148.	Left.	13	Hyperresonance.	Masked by râles.	Coarse moist.	o	N	N

The table in connection with the cavities in the lower lobe is somewhat unsatisfactory, since it is not always definitely stated in the post-mortem protocol in just what situation these cavities were. Moreover, in regard to the small cavities, most of them were very small (pea to bean size), and in addition some appeared of very recent formation.

PATHOLOGICAL CONDITIONS OTHER THAN CAVITY FORMATION IN THE UPPER PART OF UPPER LOBE.

Case No.	Autopsy.		Number of Days Before Death Examination Made.	Inspection.	Percussion Note.	Breathing.	Râles.	Whispering Pectoriloquy.	Vocal Resonance.	Tactile Fremitus.
	Pleura.	Lung.								
3896, left lung	Thickened.	One small 0.5 cm. old healed lesion with caseous center.	1	Depression above and below clavicle less than on right; no depression above or below spine of scapula, no winging of scapula.	Impairment.	Bronchial.	0	0	N	N
4224, right lung	Normal.	Tuberculous nodule at apex 2 × 1 cm.	3	Depression above and below clavicle greater than on left; slight depression above and below spine of scapula, no winging of scapula.	Dullness.	Exaggerated bronchial.	Coarse moist.	0	+	+
2019, right lung	Thickened.	Small calcified areas and some bronchopneumonia.	19	Depression above and below clavicle; no depression above or below spine of scapula, no winging of scapula.	Dullness.	Broncho-vesicular.	Fine moist.	0	+	N
4243, right lung	Normal.	Congestion, bronchopneumonia, isolated tubercles and anthracosis.	2	Depression above and below clavicle; slight depression above spine of scapula, no depression below, no winging of scapula.	Impairment.	Asthmatic.	0	0	N	N
4243, left lung	Thickened.	Recent pneumonia, considerable fibrous tissue and filled cavity.	2	No depression above or below clavicle; depression above spine of scapula, no winging of scapula.	Normal.	Broncho-vesicular.	Crepitant.	0	N	N

LOWER HALF OF UPPER LOBE.

Case No.	Autopsy.		Number of Days Before Death Examination Made.	Percussion Note.	Breathing.	Râles.	Whispering Pectoriloquy.	Vocal Resonance.	Tactile Fremitus.
	Pleura.	Lung.							
2019, left lung..	Normal.	Anthracosis (cavity at apex).	19	Normal.	Masked by râles.	Coarse moist and bubbling.	o	N	N
3896, left lung..	Thickened.	Isolated tubercles.	1	Impairment.	Bronchial.	o	o	N	N
4148, right lung	Thickened.	Numerous scattered tubercles (cavity at apex).	13	Hyperresonance.	Normal.	o	o	N	N
4224, right lung	Normal.	Many scattered tubercles.	3	Hyperresonance.	Bronchovesicular.	Coarse moist.	o	N	N
2980, left lung..	Thickened.	Closely aggregated coalesced tubercles (cavities at apex).	12	Impairment.	Amphoric.	Moist.	++	+	N
4243, left lung..	Normal.	Grayish-red consolidation (cavity at apex).	2	Dullness.	Muffled.	Crepitant.	o	N	N. R.
2019, right lung	Thickened.	Bronchopneumonia.	19	Dullness.	Bronchovesicular.	Fine moist.	o	N	N
4243, right lung	Normal.	Areas of pneumonia, isolated tubercles and anthracosis.	2	Normal.	Asthmatic.	o	o	N	N
3896, right lung	Normal.	Edema and pneumonic consolidation (many small cavities at apex).	1	Hyperresonance.	Bronchial.	o	o	N	N
4197, right lung	Normal.	Caseous consolidation (cavities at apex).	14	Hyperresonance.	Bronchial.	Coarse moist.	o	+	+
4232, left lung..	Thickened.	Areas of caseous consolidation and edema	24	Dullness and hyperresonance.	Bronchovesicular.	o	o	N	N
4197, left lung..	Normal.	Caseous consolidation with cavities.	14	Tympany and dullness.	Amphoric.	Metallic moist and bubbling.	+	++	+

RIGHT MIDDLE LOBE.

Case No.	Autopsy.		Number of Days Before Death Examination Made.	Percussion Note.	Breathing.	Râles.	Whispering Pectoriloquy.	Vocal Resonance.	Tactile Fremitus.
	Pleura.	Lung.							
2980.....	Thickened.	Slight edema, otherwise normal.	12	Impairment.	Bronchial.	Moist.	o	+	N
2019.....	Thickened.	Areas of coalesced tubercles.	19	Dullness.	Masked by râles.	Fine moist.	o	N	N
4224.....	Normal.	Scattered miliary tubercles uniformly distributed.	3	Hyperresonance.	Broncho-vesicular.	o	o	N	N
4243.....	Normal.	Congested, one small pneumonic area, anthracosis and several isolated tubercles.	2	Normal.	Normal.	o	o	N	N. R.
4197.....	Normal.	Moderate infiltration with coalesced miliary tubercles of peribronchial type, about one-half of lobe being involved.	14	Hyperresonance.	Bronchial.	Coarse moist.	o	+	+
3896.....	Normal.	Edema, grayish pneumonic consolidation.	1	Hyperresonance.	Bronchial.	o	o	N	N
4148.....	Normal.	General consolidation by coalesced tubercles.	13	Hyperresonance.	Normal.	o	o	N	N
3548.....	Thickened.	Cavity 5 × 2½ × 2 cm. surrounded by consolidation; involvement of practically the whole lobe.	10	Dullness.	Masked by râles.	Coarse moist.	o	+	+
4232.....	Thickened.	Several large communicating old cavities though possibly filled, surrounded by acute pneumonic and old caseous consolidation.	24	Dullness.	Amphoric.	Metallic.	++	++	+

UPPER HALF OF LOWER LOBE POSTERIORLY.

Case No.	Autopsy.		Number of Days Before Death Examination Made.	Percussion Note.	Breathing.	Râles.	Whispering Pectoriloquy.	Vocal Resonance.	Tactile Fremitus.
	Pleura.	Lung.							
3896, left lung..	Normal.	A few scattered miliary tubercles.	1	Normal.	Broncho-vesicular.	o	o	+	N
2980, right lung	Thickened.	Congestion and a few tubercles.	12	Impairment.	Bronchial.	Moist.	o	N	N
4224, right lung	Normal.	Scattered tubercles.	3	Normal.	Bronchial.	o	o	N	N
4197, right lung	Normal.	Scattered coalesced tubercles.	14	Normal.	Bronchial.	o	o	N	N
2980, left lung..	Thickened here and there.	Congestion, consolidated areas of coalesced caseous tubercles and a few isolated tubercles.	12	Hyperresonance.	Masked by moist râles.	Moist.	o	N	N
4148, right lung	Slightly thickened.	Coalesced caseous tubercles and isolated groups of tubercles.	13	Normal.	Normal.	o	o	N	N
2019, right lung	Thickened.	Areas of coalesced tubercles and bronchopneumonia.	19	Normal.	Masked by fine moist râles.	Fine moist.	o	+	N
4243, right lung	Normal.	Congestion and small pneumonic areas.	2	Normal.	Broncho-vesicular.	o	o	N	N
4243, left lung..	Normal.	Some recent pneumonic infiltration, a few scattered tubercles and anthracosis.	2	Normal.	Broncho-vesicular.	o	o	N	N
4232, left lung..	Normal.	Congestion, coalesced tubercles and some pneumonic infiltration.	24	Hyperresonance.	Broncho-vesicular.	o	o	N	N

UPPER HALF LOWER LOBE POSTERIORLY.—(*Continued.*)

CASE No.	AUTOPSY.		NUMBER OF DAYS BEFORE DEATH EXAMINATION MADE.	PERCUSSION NOTE.	BREATHING.	RÂLES.	WHISPERING PECTORILOQUY.	VOCAL RESONANCE.	TACTILE FREMITUS.
	Pleura.	Lung.							
4197, left lung..	Normal.	Grayish-yellow consolidation.	14	Dullness.	Bronchial.	A few moist.	o	+	N
3896, right lung	Normal.	Edema and grayish pneumonic consolidation.	1	Hyperresonance.	Bronchovesicular.	o	o	+	N
4224, left lung..	Normal.	Consolidation with large caseous and grayish pneumonic areas.	3	Normal.	Masked by coarse moist râles.	Coarse moist.	o	N	N
4232, right lung	Thickened.	Large cavity.	24	Tympany.	Exquisite amphoric.	Metallic crackles.	++	++	+
3548, left lung..	Thickened.	Large cavity.	10	Hyperresonance.	Bronchial.	A few moist.	o	N	N
3548, right lung	Thickened.	Small honeycombed cavities, groups of coalesced tubercles and congestion.	10	Tympany.	Cavernous.	o	+	++	+
2019, left lung..	Normal.	Small cavities about 1 cm. in diameter, one large area of coalesced caseous tubercles and areas of bronchopneumonia.	19	Impairment.	Inspiration masked by moist râles, expiration normal.	Coarse moist and bubbling.	o	N	N
4148, left lung..	Thickened.	One small cavity in the middle of posterior part and another not located about 1.5 cm. in diameter.	13	Hyperresonance.	Masked by râles.	Coarse moist.	o	N	N

LOWER HALF OF LOWER LOBES.

Case No.	Autopsy.		Number of Days Before Death Examination Made.	Percussion Note.	Breathing.	Râles.	Whispering Pectoriloquy.	Vocal Resonance.	Tactile Fremitus.
	Pleura.	Lung.							
4243, right lung	Normal.	Congestion.	2	Normal.	Broncho-vesicular.	o	o	N	N
4224, right lung	Normal.	Scattered tubercles.	3	Normal.	Bronchial.	o	o	N	N
3896, left lung..	Normal.	A few scattered miliary tubercles.	1	Normal.	Broncho-vesicular.	o	o	+	N
4197, right lung	Normal.	Scattered coalesced tubercles.	14	Normal.	Bronchial.	o	o	N	N
4224, left lung..	Normal.	Isolated and small groups of caseous tubercles.	3	Normal.	Masked by coarse moist râles.	Coarse moist.	o	N	N
4197, left lung..	Normal.	Groups of caseous tubercles with some air-bearing tissue between.	14	Normal.	Bronchial.	Few moist.	o	N	N
3548, right lung	Thickened.	Groups of coalesced tubercles and congestion.	10	Hyperresonance.	Bronchial.	Coarse moist.	o	+	—
4148, right lung	Slightly thickened.	Coalesced caseous tubercles and isolated groups of tubercles.	13	Normal.	Normal.	o	o	N	N
4243, left lung..	Normal.	Some recent pneumonic infiltration, a few scattered tubercles and anthracosis.	2	Normal.	Broncho-vesicular.	o	o	N	N
3548, left lung..	Thickened.	Areas of caseous pneumonia and a few isolated tubercles.	10	Impairment.	Bronchial.	A few moist.	o	N	N

LOWER HALF OF LOWER LOBES.—(*Continued.*)

CASE NO.	AUTOPSY.		NUMBER OF DAYS BEFORE DEATH EXAMINATION MADE.	PERCUSSION NOTE.	BREATHING.	RÂLES.	WHISPERING PECTORILOQUY.	VOCAL RESONANCE.	TACTILE FREMITUS.
	Pleura.	Lung.							
2019, right lung	Thickened.	Areas of coalesced tubercles and bronchopneumonia.	19	Impairment.	Masked by râles.	Fine moist.	o	+	N
2980, left lung..	A few adhesions.	Congestion, consolidated areas of coalesced caseous tubercles and a few isolated tubercles.	12	Hyperresonance.	Masked by râles.	Moist.	o	N	N
4232, left lung..	Normal.	Congestion, coalesced tubercles and some pneumonic consolidation.	24	Hyperresonance.	Bronchovesicular.	o	o	N	N
3896, right lung	Normal.	Edema and grayish pneumonic consolidation.	1	Hyperresonance.	Bronchovesicular.	o	o	+	N
4232, right lung	Thickened.	Areas of acute pneumonic consolidation and of old caseation.	24	Dullness.	Exquisite amphoric.	Metallic crackles.	++	++	+
2980, right lung	Thickened.	Congestion, areas of coalesced tubercles and one small cavity.	12	Impairment.	Bronchial.	Moist.	o	—	—
2019, left lung..	Normal.	Small cavities about 1 cm. in diameter, one large area of coalesced caseous tubercles, and areas of bronchopneumonia.	19	Impairment.	Inspiration masked by moist râles, expiration normal.	Coarse moist and bubbling.	o	N	N
4148, left lung..	Thickened.	Numerous groups of caseous coalesced tubercles and congestion.	13	Normal.	Normal.	o	o	N	N

From this study it is evident that in order to discover the meaning of the physical signs in connection with the pathological findings the examination should have been made immediately preceding death. This was not always possible, because sometimes the patient died unexpectedly, and sometimes the patient was so very ill for even three or four weeks preceding death that the disturbance necessary for such an examination was not considered humane.

This study will be continued in future reports, however, and when we have a sufficient number of cases we will make a synopsis and comparison of those in which there was no reason to suppose that there was any difference between the condition at the time of the examination and the condition post-mortem.

JOSEPH WALSH.

PATHOLOGICAL REPORT OF THE YEAR.

In this year's pathological report the changes in the organs have been tabulated according to the method adopted last year. It has been decided not to repeat the general descriptions of lesions, but only to make such additions as the observations of the year warranted. Our autopsy statistics have become large enough now for us to draw conclusions from our findings, and this we have attempted to do in connection with the statistics.

The statistical summary this year has been divided into the summary for the first two years, and the summary for the last two years. The reason for this is that the findings of the first two years fail to describe many of the minuter lesions in the different organs, so that a comparison with the last two years is impossible. The autopsies of the first two years were performed sometimes under unfavorable conditions and sometimes hurriedly, and were recorded on a general blank, so that the records are often incomplete or lack uniformity of description. During the past two years a detailed autopsy blank which requires all the autopsy findings to be recorded in exactly the same way in every case has been used. This has produced uniform records and allows a detailed tabulation of the various conditions.

The table on weights and measurements represents the measurement and weight of the body and organs compared with the standard weight of the body for the height and age. The body-weight of each case has been taken from the clinical history, *i. e.*, the highest weight and average weight from the statement of the patient and the last weight from the weight record on the clinical chart.

For comparing the weight of the individual with the standard normal weight the weight scale of the New York Life Insurance Company (usually called the "Nylic Standard") has been used.

MEASUREMENT AND WEIGHT OF THE BODY AND ORGANS COMPARED WITH THE STANDARD WEIGHT OF THE BODY FOR THE HEIGHT AND AGE.

Case Number.	Sex.	Age.	Height.	Normal Weight.	Highest Weight.	Average Weight.	Last Weight.	Heart.	Liver.	Spleen.	Pancreas.	L. Lung.	R. Lung.	L. Kidney.	R. Kidney.	Appendix.
903	M.	31	Ft. In. 5 8	154	176	165	107½	15.5×13×6.5 589 g.	28×20.5×7.5 1767 g.	12×9.5×4.5 232.5 g.	12.8×6.5×1.3 300 g.	25×14.5×7.5 1271 g.	19.5×7.5×9 930 g.	12.5×6.5×3.2 217 g.	13.3×6.5×4.5 232.5 g.	N. R.
1975	M.	27	5 6	140	125	125	96	N. R.	25×18×9 1984 g.	14×10×5 403 g.	N. R.	N. R.	N. R.	N. R.	N. R.	3
2019	M.	23	5 10	156	135	135	120½	11×10×7 460 g.	19×21×7 1375 g.	9×7.5×2.75 80 g.	19×3×2.5 125 g.	29×18×6.5 1100 g.	30×19×6 950 g.	12×5×4 200 g.	12×5.75×3.5 180 g.	5.75
2727	M.	26	5 7½	145	140	136	88	5×4×1.75 248 g.	26×24×11.5 2790 g.	17.7×9×4.5 310 g.	21.5×4×1.3 124 g.	20.5×16.5×5.5 806 g.	22.3×18×6.5 558 g.	12.5×7.5×3.2 155 g.	12.5×7.5×3.2 186 g.	11.5
2861	F.	29	5 4	128	128	110	117	11×12×6.5 450 g.	17×23×8 1150 g.	11×4×3.5 80 g.	15×2.25×1.5 60 g.	23×11×5.5 500 g.	22×12×7 750 g.	14×5.5×4 180 g.	7×5.5×3 120 g.	7
2980	M.	32	5 10½	167	190	165	150	8.5×5.5×2.25 589 g.	28×22×9.5 2294 g.	14×12×4 403 g.	18×2.5×2 124 g.	23×15×6.5 1302 g.	23×18×8.3 1550 g.	11.5×8.3×4 217 g.	11×7.5×3.3 217 g.	12.7
3052	M.	45	N. R.	N. R.	175	175	100½	N. R. 310 g.	25×16.5×7.5 1550 g.	N. R. 155 g.	23×4×1.3 155 g.	24×17.5×9 744 g.	26.5×25×6.5 775 g.	11×7×4 201.5 g.	13×6.5×4 155 g.	8.3
3119	F.	36	5 1	122	N. R.	N. R.	104½	10×7.5×5 160 g.	25×15×8 1300 g.	15.5×8×4.5 320 g.	16×5×3.3 100 g.	21×16×8 600 g.	18×14×6.5 550 g.	15.5×9×3.5 260 g.	13×8×4 210 g.	5
3393	M.	22	5 8½	149	133	132	100	9×9×5 190 g.	22×29×10 2850 g.	16×11×6 420 g.	17×3.5×2 100 g.	21×18×7 950 g.	28×18×6.5 750 g.	12.5×6×3.5 150 g.	14×6×3.5 160 g.	12
3441	M.	52	5 9	166	162	160	108½	14×12×5 279 g.	35.5×28×16.5 2449 g.	N. R.	21×5.5×1.3 93 g.	N. R. 651 g.	N. R. 961 g.	N. R. 232.5 g.	N. R. 219 g.	5
3548	M.	18	5 6	133	94	85	81½	12×9×4.5 248 g.	24.2×19×7 1612 g.	10.2×7×2.5 N. R.	21.5×4.5×4.5 N. R.	23×16.2×6.5 992 g.	25×18.5×5.8 992 g.	N. R.	11×6×2 N. R.	7
3643	M.	31	5 11	168	180	175	119½	14×10×3 250 g.	30×21×7.5 2600 g.	17×9×4 250 g.	20×2.5×5 150 g.	23×16×6 600 g.	22×10×4.5 780 g.	13×8×4 200 g.	13×7×3.5 200 g.	5
3677	F.	23	5 1½	118	102½	102½	74½	10×8.5×3.5 150 g.	24×22×6 1400 g.	12×8×4 170 g.	14×4×1.5 150 g.	20×10×4 650 g.	20×14×6 700 g.	12×4.5×3.5 110 g.	9×3×2.5 110 g.	4.5
3731	F.	25	5 4½	126	141	120	84½	N. R. 294.5 g.	24×24×9 1829 g.	12.7×7.5×4.5 217 g.	17.8×4.5×3 139.5 g.	21×12×7.5 837 g.	21.5×20.5×7.7 837 g.	11.5×6.5×4 170.5 g.	11.5×6.5×4.5 186 g.	N. R.
3792	M.	32	5 7	150	137	132	88½	20×13×5.5 434 g.	29.2×17.5×7.5 1612 g.	14.7×6.5×2 155 g.	20.2×3.8×2.5 155 g.	24×17.5×6.5 1178 g.	25.5×18×10 1953 g.	11.5×7.5×3.2 186 g.	11.5×7.5×3.2 186 g.	5

N. R. signifies not recorded.
The normal weight is calculated from the height and age according to the New York Life Insurance Company's standard table.
The measurements of the organs are in centimeters.

MEASUREMENT AND WEIGHT OF THE BODY AND ORGANS COMPARED WITH THE STANDARD WEIGHT OF THE BODY FOR THE HEIGHT AND AGE.—(*Continued.*)

Case Number.	Sex.	Age.	Height.	Normal Weight.	Highest Weight	Average Weight.	Last Weight.	Heart.	Liver.	Spleen.	Pancreas.	L. Lung.	R. Lung.	L. Kidney.	R. Kidney.	Appendix.
			Ft. In.													
3831	M.	37	5 10	166	150	145	117½	9.5X12X5.5 350 g.	26X20X9.5 2150 g.	11.5X8.5X3.5 150 g.	21X4.5X1.5 140 g.	22X12X5.5 750 g.	25X17X7 800 g.	10.5X5.5X3.5 140 g.	10X5X3.5 140 g.	11.5
3880	M.	21	5 6	137	110	106	92¾	13X11X6.5 403 g.	23X21.5X8.5 1581 g.	9.5X6X3.5 93 g.	21.5X4.5X2 77.5 g.	22X20.5X8.5 899 g.	20.5X13.5X7 589 g.	11.5X6.5X4 155 g.	11.5X6X4 155 g.	7.5
3887	F.	37	5 4½	136	155	133	101¾	11.5X10.5X5.5 341 g.	30.5X19X6.5 1581 g.	14X8.3X3.3 217 g.	21.5X4.5X2 N. R.	N. R.	21.5X16.5X9 1147 g.	12X5X4.5 170.5 g.	12X5.8X4.5 170.5 g.	6
3896	M.	27	6	169	160	150	120½	7.5X11.5X5 558 g.	28X20.5X7 1860 g.	13.5X7.5X4.5 217 g.	18X4X2 124 g.	23X16.5X5 930 g.	23X20.5X7 1488 g.	13X7X3.8 232.5 g.	12.8X7.8X3.2 217 g.	10.2
3907	F.	35	N. R.	N. R.	160	100	N. R.	14X7X5 248 g.	26X21.5X9.5 2480 g.	14X9.5X4 N. R.	18X5X1.3 93 g.	21 5X17.5X9 992 g.	21.5X23X6.5 1085 g.	12X5.5X3.5 248 g.	12X7.5X4 248 g.	7
3918	M.	21	N. R.	N. R.	135	130	N. R.	10.3X10.8X7 465 g.	26.5X17.5X9 1984 g.	11.5X8.3X3.3 124 g.	19X4X2 124 g.	21.5X19X9 1612 g.	25.5X18.5X8.3 1116 g.	12X7.5X3.5 217 g.	12X7X3.5 186 g.	11.5
3931	M.	20	5 9½	150	131	131	98¼	14X11.5X5 300 g.	N. R.	12.8X10.3X2.5 160 g.	N. R.	21.5X16.5X9 1050 g.	21.5X14X9 1240 g.	12.5X5X3.8 178 g.	12X5.8X3.3 170 g.	8.3
3941	M.	29	6 1½	178	150	135	88½	20.5X11.5X4 372 g.	28X21.5X10 1798 g.	12.5X9X1 139 g.	19X4X0.5 77.5 g.	28X21.5X6.5 1240 g.	20.5X14X8.5 1271 g.	12X7X3.5 186 g.	12.8X6.5X3 132 g.	10
3949	M.	38	5 6	148	148	140	97½	12X8.3X5.8 217 g.	29.5X18X5 1488 g.	15X7.5X3.8 139.5 g.	18X4X2 108.5 g.	23X19.5X7.5 1395 g.	23.5X16.5X9.5 1519 g.	14X7X2.5 217 g.	12.8X8.2X2.5 217 g.	6.5
3953	F.	24	5 4	125	125	120	N. R.	15X10X3.3 210 g.	30.5X13X5 2760 g.	14X9X7.5 230 g.	20.5X4.5X1 80 g.	28X20.5X7.5 650 g.	20.5X14X5.5 900 g.	14X6.5X4 180 g.	12.5X5X2.5 165 g.	10
3961	M.	23	5 8	146	137	133	93¼	15X10X5 310 g.	26X20.5X6 1370 g.	11X9.5X3.5 145 g.	18X3.5X2 75 g.	27X13.5X5 630 g.	27X14.5X7.5 665 g.	12X7X3 140 g.	12X7X3 155 g.	10
4010	F.	16	5 3	115	103	103	77¾	13X11X5 320 g.	23X20.2X6.5 N. R.	13.5X6.5X2.5 120 g.	15.2X4X1.3 100 g.	20.5X12.8X6.5 780 g.	21.5X16.5X7.5 740 g.	11.5X3.8X2.5 120 g.	10.8X5X2.5 120 g.	5.75
4021	M.	34	5 7⅛	154	168	168	101¾	11X10X5 315 g.	28X20X7.5 1985 g.	15X11X3 300 g.	18X3.5X2 150 g.	25X19X8 1750 g.	22X16X7 1360 g.	12.5X7X3.5 210 g.	12X7X4 200 g.	7
4023	M.	50	5 5½	150	161½	155	N. R.	13X9X4.5 270 g.	26.5X19X6.5 1610 g.	15.2X11.5X3 350 g.	N. R.	28X18X5.8 1170 g.	25.5X16.5X4.5 1150 g.	10X6.5X2 130 g.	10X6.5X2.3 130 g.	N. R.
4040	M.	26	5 6	140	138	130	99	11.5X8X5.5 230 g.	30.5X19X8.3 1750 g.	15.2X11.5X4 350 g.	16.5X7.5X3.5 125 g.	21X18X9 1160 g.	24X17.5X11.5 1800 g.	14X8.3X3.2 190 g.	11.5X5.5X3 180 g.	7.5
4097	M.	32	5 7½	151	127	127	84	9X8.5X4 150 g.	21X25X6 1050 g.	10.5X7X2 75 g.	20X4X1.75 100 g.	23X15X8 950 g.	23X14X8 1250 g.	11.5X5X3 105 g.	11.5X4X3 100 g.	6
4122	M.	21	N. R.	N. R.	162	N.R.	N. R.	9X9X8 250 g.	26X20X8 1750 g.	18X10X3.5 430 g.	18X3X2 90 g.	22X16X9 1750 g.	22X16X8 1250 g.	12X6X3 120 g.	12X5.5X3 120 g.	6

4140	F.	22	4 11½	109	145	N. R.	N. R.	8.3X9X6 260 g.	27X19X8 1700 g.	13.5X7.5X4 210 g.	16X4.5X2 120 g.	20X11X7.5 N. R.	17.5X11X9 N. R.	12X5X3.5 150 g.	12X5X3 150 g.	7.5
4141	M.	60	5 6½	156	140	140	111	12X9X4 300 g.	26X14X9 1200 g.	16X10X3 300 g.	20X5X2 100 g.	28X17X10 1200 g.	27X20X8 1250 g.	12X6.5X2 150 g.	12X5X2.5 150 g.	8
4148	M.	32	5 7½	153	165	165	118	9X9X5 270 g.	25X18X5.5 1250 g.	12X8X2.5 150 g.	18X3X2 100 g.	26X18X8 1400 g.	26X19X6 1200 g.	N. R.	13X6X2.5 N. R.	5.75
4155	M.	29	5 3	130	108	105	68½	9X8.5X3.5 190 g.	23X18X7 1250 g.	10X6.5X3 90 g.	16X3X1.25 80 g.	22X15X6 690 g.	23X17X6 750 g.	11X5X3 120 g.	11X5.5X3 110 g.	9
4164	F.	34	5 3	127	135	125	N. R.	10X9X5 220 g.	24X22X8 1350 g.	13X8.5X2.5 160 g.	17X3X1.5 60 g.	24X17X7.5 1000 g.	23X17X7 850 g.	10.5X5.75X3 150 g.	11X5.75X3 120 g.	7.5
4168	F.	27	5 2	120	110	110	77½	14X10X4.5 270 g.	27X18X6.5 1050 g.	12X7.5X3 140 g.	15X4X1.5 50 g.	23X14X5 700 g.	20X13X7 950 g.	13X6X3.5 150 g.	11X6.5X2.75 125 g.	6
4180	F.	32	5 3½	129	103	100	76	13X9X4 250 g.	21X23X5 1300 g.	12X6.5X3.5 150 g.	14.5X4.5X2 100 g.	21X14.5X5.5 600 g.	21X14.5X6 700 g.	11X5X2.25 100 g.	11X5X2.5 100 g.	12
4197	M.	30	5 4½	137	145	130	95½	10X11.5X4.5 350 g.	20.5X30.5X9 1900 g.	14X9.5X2.5 200 g.	19X4X1.3 150 g.	24X16.5X6.5 1150 g.	24X16.5X7.5 1375 g.	12.8X5X4 200 g.	11 5X4.8X4 190 g.	7.5
4198	M.	51	5 7½	161	156	156	95	10.5X9.5X4.25 210 g.	23X29X11.5 2400 g.	14.5X10X3.5 250 g.	19X5X2 110 g.	26X15X8 820 g.	23X11X4 550 g.	12.5X6.5X3.5 160 g.	12.5X6X3 150 g.	Not found
4202	M.	38	N. R.	N. R.	N. R.	N. R.	N. R.	11X10.5X9.25 300 g.	28X18X9 1150 g.	14X8X2.25 120 g.	18X4X2 N. R.	26X14X7 800 g.	25X14X7 800 g.	12X5X3 150 g.	12X5X3 110 g.	8
4221	M.	52	5 6½	153	135	125	92½	10X12X4 340 g.	26X18X6 1300 g.	14X8X3 110 g.	18X3X2 100 g.	23X16X5.5 800 g.	23X17X6.5 1040 g.	12X5X2.25 115 g.	11X6X2.5 130 g.	8
4224	M.	34	5 6½	147	152	138	101½	11.5X13X5 480 g.	17.5X26.5X7.5 1650 g.	16.5X8.3X4.5 300 g.	16.5X4X2 200 g.	25.5X18X6.5 1020 g.	26.5X19X7 850 g.	15.2X7X5 350 g.	11.5X5X4 250 g.	9
4232	M.	40	5 9½	165	148	140	103	8.5X12X6 380 g.	25X27.5X7.5 1950 g.	12X10X3 110 g.	20X3X2 180 g.	28.5X20X8 1350 g.	25X17X7.5 1640 g.	12.5X5X4 180 g.	13X5X3.5 170 g.	7
4243	M.	32	5 8	154	137½	N. R.	N. R.	9X10X6 280 g.	29.5X21X9 1700 g.	10X14X2.5 250 g.	15X4.5X2 120 g.	22X15X7.5 850 g.	27X16X8 800 g.	13X3.5X5 240 g.	12.5X6.5X4 200 g.	6.5
4246	M.	15	4 11	108	85	N. R.	N. R.	9X8X4 210 g.	24X17X6 1050 g.	12.5X7.5X3.5 150 g.	14X3X1.75 100 g.	19X10X5 450 g.	22X16X6 610 g.	11X3.5X2 100 g.	9.5X3X2 110 g.	11
4248	M.	26	6 2	177	212	198	N. R.	10X9X3.5 330 g.	27X21X7 2450 g.	15X11.5X4 400 g.	20X4X1.5 N. R.	22X14.5X7 1650 g.	24X14.5X8 1310 g.	14X5.5X3.5 240 g.	13X7X4 240 g.	8
4272	M.	49	5 9½	169	156	150	112½	11X10X5 270 g.	19X28X8 1350 g.	15X9X3.25 210 g.	18X4X1.5 140 g.	21X17X4.5 950 g.	28X21X6.5 1350 g.	12.5X5.75X3.5 170 g.	12.5X5.5X3.75 170 g.	8.5
4281	M.	32	N. R.	N. R.	137	N. R.	N. R.	9X9.5X4.5 250 g.	24X19X6.5 1450 g.	13X7X4 160 g.	14X3.2X2 100 g.	23X13X6 850 g.	24X14X8 850 g.	12X4.5X4 160 g.	11.5X5.5X3.5 150 g.	8.5
4282	M.	30	5 11½	169	168	154	119½	10X8.5X5 300 g.	26X21X6.5 2100 g.	12X9X2.5 160 g.	18X3X2.5 150 g.	27X19X7 1350 g.	27X19X6.5 1220 g.	12.5X6.5X3.5 250 g.	12X6.5X3 210 g.	12
4287	M.	33	5 10	164	154	154	111	9.5X9X4.5 310 g.	23X19X6.5 1650 g.	10X5X3 90 g.	16X4X2 110 g.	23X15X7 750 g.	25X12X6 950 g.	12X5X3 150 g.	11X5X3 120 g.	4

N. R. signifies not recorded.
The normal weight is calculated from the height and age according to the New York Life Insurance Company's standard table.
The measurements of the organs are in centimeters.

MEASUREMENT AND WEIGHT OF THE BODY AND ORGANS COMPARED WITH THE STANDARD WEIGHT OF THE BODY FOR THE HEIGHT AND AGE.—(*Continued.*)

Case Number.	Sex.	Age.	Height.	Normal Weight.	Highest Weight.	Average Weight.	Last Weight.	Heart.	Liver.	Spleen.	Pancreas.	L. Lung.	R. Lung.	L. Kidney.	R. Kidney.	Appendix.
4306	F.	36	5 4	133	N. R.	N. R.	70½	9×10×3.8 270 g.	20×26×5.7 1250 g.	13.5×7.5×2.75 110 g.	17.5×5×1.75 100 g.	21.5×12.7×5 1050 g.	21.5×14×7 950 g.	10.5×4.75×3.75 110 g.	10.5×4.75×3.75 110 g.	7
4316	M.	17	5 6	133	117	117	87	10.5×8×5 190 g.	20.5×25.5×9.5 1800 g.	14.5×10.5×4.5 280 g.	19×4.5×2 120 g.	24×22×8 930 g.	26×26×11.5 750 g.	13.5×7×4 200 g.	13×6.5×4 175 g.	9.5
4345	M.	23	5 9	151	173	166	111½	10.5×10×4.75 200 g.	30.5×27.5×12.75 4200 g.	19×10.75×5 1050 g.	16.5×6.5×2.5 125 g.	21.5×16.5×6.5 900 g.	24×20×7 850 g.	12.5×7×3.75 180 g.	12.5×6.5×3 160 g.	N. R.
4364	F.	34	N. R.	N. R.	N. R.	N. R.	N. R.	11×14.5×5 330 g.	30×21.5×8.5 2050 g.	18×8×3 160 g.	20×6×2 105 g.	24×11×6 910 g.	23×20×6.5 1080 g.	12.5×6×4 168 g.	11.5×7×3 140 g.	N. R.
4371	M.	46	5 7	155	155	130	90½	13×17×5 217 g.	24.5×22×5.5 1220 g.	9×10.5×4 280 g.	21.5×4×1 80 g.	27×18×5 665 g.	25.5×17×6.5 960 g.	11.5×6×3 120 g.	11.5×6.5×2.5 110 g.	4
4380	M.	39	5 8	153	103	160	117	12×12.5×4.5 415 g.	18×31.5×7 1710 g.	11.5×6.5×2.5 95 g.	20×3.5×2.5 115 g.	25.8×21×7 1265 g.	28×19×7 1390 g.	13×5.5×3.5 160 g.	13×6.5×3.5 170 g.	6
4415	M.	37	5 8	152	176	176	N. R.	16×11.5×5 N. R.	28×21×8.5 2020 g.	12×7×4.5 225 g.	19.5×6×1.5 120 g.	28.5×20×8 1660 g.	26.5×22×8 1595 g.	13×7×3 210 g.	12.5×7×3 185 g.	8
4460	M.	26	N. R.	N. R.	132	132	102	10.8×10.8×4.5 350 g.	19×25.5×7.5 1750 g.	12×7.5×2.5 140 g.	19×6.5×2.5 150 g.	18×25.5×8.3 1600 g.	26.5×19×7.5 1250 g.	10.8×5×3.2 150 g.	11.5×5.7×2.8 150 g.	10.2
4462	F.	15	4 11	103	105	N. R.	73	11×9.5×4 205 g.	19×25.5×6 1225 g.	11.5×7.5×2.5 105 g.	15×3.5×2 80 g.	20×14×5 570 g.	22.5×18×7 675 g.	11×6×4 125 g.	12×5.5×3.5 125 g.	12
4500	M.	63	N. R.	N. R.	N. R.	N. R.	N. R.	9×9.5×4.75 260 g.	23×18×7 1450 g.	8×7.5×2.5 130 g.	23×4×1.3 110 g.	23.5×17×6.5 1000 g.	24×19×7.5 975 g.	11.5×5×3.3 155 g.	12.5×5×3.3 155 g.	6.5
4522	M.	28	N. R.	N. R.	160	150	110	15×11.5×5 415 g.	19.5×33×9 2210 g.	16×11×3 245 g.	20×4×2.5 120 g.	22×14×5.5 1390 g.	23.5×17.5×9 1100 g.	12×6×3.5 190 g.	12×5.5×3.5 165 g.	9
4587	F.	17	N. R.	N. R.	N. R.	N. R.	N. R.	13×11×6 335 g.	25.5×18×7 1220 g.	12×7×3 90 g.	18×4×2 67 g.	25×15×6 710 g.	23.5×15.5×8 1400 g.	11.5×5×3.5 100 g.	13×7×3.5 140 g.	9
4659	M.	23	5 11	160	173	155	109½	13×10.5×5 330 g.	20.5×32×8 1670 g.	16×9×3 210 g.	25×5×2 155 g.	27×16×7 1075 g.	26.5×16×7 1180 g.	12×6.5×3.5 170 g.	11.5×7×3 150 g.	N. R.
4735	M.	19	5 4	127	132	132	113½	15×9×5 260 g	21×28×7.5 2020 g.	15.5×10×4 270 g.	17.5×5×2.5 120 g.	N. R.	23×16×6 580 g.	12.5×5.5×3 165 g.	13.5×6×3 165 g.	5

N. R. signifies not recorded.
The normal weight is calculated from the height and age according to the New York Life Insurance Company's standard table.
The measurements of the organs are in centimeters.

EMACIATION.

Emaciation was recorded as.....	None,.....	11	66 cases
	Some,.....	46	
	Marked,.....	8	
	Extreme,.....	1	

SUMMARY FOR FIRST TWO YEARS.

Emaciation was recorded as.....	None,.....	20	140 cases
	Some,.....	52	
	Marked,.....	56	
	Extreme,.....	12	

SUMMARY FOR LAST TWO YEARS.

Emaciation was recorded as.....	None,.....	27	123 cases
	Some,.....	73	
	Marked,.....	18	
	Extreme,.....	5	

SUBCUTANEOUS FAT OF ABDOMINAL AND THORACIC WALLS.

Subcutaneous fat was recorded as...	Normal,.....	27	66 cases
	Increased,.....	1	
	Diminished,.....	38	

SUMMARY FOR FIRST TWO YEARS.

Subcutaneous fat was recorded as...	Normal,.....	25	140 cases
	Increased,.....	1	
	Diminished,.....	106	
	Not recorded,.....	8	

SUMMARY FOR LAST TWO YEARS.

Subcutaneous fat was recorded as...	Normal,.....	54	123 cases
	Increased,.....	3	
	Diminished,.....	66	

From a comparison of the general data tabulated in the table on weights and measurements with the table on emaciation and the table on subcutaneous fat of abdominal and thoracic walls much of interest may be obtained. Phthisis, as the name applied to chronic tuberculosis of the lungs indicates, is a disease with marked emaciation or loss of body-weight. This loss of body-weight will be seen at a glance in the table on weights and measurements when the lowest weight recorded is compared with the highest weight or the normal weight. In the great majority of cases the loss of body-weight is most striking.

It will be seen further that the great majority of cases never attained the average normal weight for individuals of their height; in other words, that the majority of cases were never robust individuals. The average normal weight for the forty-four cases of which a complete record was made, was males 152.7 lbs., females 124.5 lbs.; the average weight was males 140.5 lbs., females 111.2 lbs.; in other words, these forty-four cases were about 9% underweight as compared with the normal standard. As to the possible causes of this under-development in the cases dying of chronic pulmonary tuberculosis, only an intimation can be given. It is well known that a great group of cases which eventually die of pulmonary tuberculosis have been anemic, poorly nourished, and prone to the common infections (such as colds, etc.) throughout their whole life. If one believes in the newer theory of tuberculosis, namely, that tuberculosis is an infection of early life, it may be that the early engrafted tuberculosis contributes to this general under-development.

Comparing the average last weight recorded (males 103 lbs., females 87 lbs.) of the forty-four cases with the average usual weight (males 140.5 lbs., females 111.2 lbs.) and average highest weight (males 147.6 lbs., females 120.4 lbs.), it will be seen that the average loss was males 37.5 lbs. and females 24.2 lbs., from their usual weight, and males 44.6 lbs. and females 33.4 lbs. from their highest weight. In other words, the forty-four cases not only showed loss of weight when considered individually, but when taken collectively this loss of weight was one-third of the total average weight. It must not be forgotten, however, that in cases of tuberculosis, the infection (even the active infection) usually extends over a sufficient number of years to permit of the emaciation having come on gradually.

The comparison of body-weight with the weight of the various internal viscera is also of interest. In a very broad sense, in chronic pulmonary tuberculosis the patient may be said to emaciate externally and lose in general body-weight, while internally

the organs actually increase in weight and size. In making the comparisons, however, the individual should always be considered as a unit in himself. Comparing the weight of the organs with the lowest recorded body-weight of the case, it will be seen that great discrepancies often exist. In many instances the weights of the internal organs are not only excessive for the size of a normal individual, but are enormous when the emaciation of the body is taken into consideration.

In the three tables there is a general agreement. In the table on emaciation it is seen that an emaciated condition is present to some degree at the time of autopsy in each case, yet the amount of emaciation is not so marked as the table on weights and measurements would indicate. This, however, can be explained by the personal factor which enters into the record at the autopsy. In the table on subcutaneous fat a similar explanation holds; but it is also true that the amount of subcutaneous fat, especially over the abdomen, varies greatly in different cases.

In our tables the amount of subcutaneous fat is recorded as normal in twenty-seven out of the sixty-six cases. The fat in this tissue decreases less rapidly than it does in other parts of the body, and frequently this layer of fat may be one to two centimeters in thickness, when the fat elsewhere is almost absent. Further, when the subcutaneous fat over the abdomen is moderately thick, the fat in the mesentery and omentum is generally fairly well perserved. In these cases the subcutaneous fat elsewhere may be greatly decreased.

The varying degrees of emaciation in these cases are difficult to explain. Emaciation accompanies most chronic diseases, and especially chronic infectious diseases, of which tuberculosis is the most common example. The fact that most of the organs of the body in tuberculosis are extensively diseased, either by the tuberculous process itself or by secondary changes in parenchymatous tissue, is sufficient reason why the normal function of

those organs should be seriously impaired, and this impairment of function readily accounts for the wasting.

Moreover, the absorption of toxic material leads to emaciation. This is true in general sepsis, resulting from the invasion of various bacteria. Tuberculosis, while not usually considered a septic condition, reacts on the tissues in somewhat the same way, especially when associated with mixed infection. We know that tuberculin injected experimentally into animals in large doses leads to rapid emaciation and finally death. In cases of phthisis the body becomes virtually a living culture-medium for the tubercle bacillus, and to a less extent for other micro-organisms, and it is, therefore, probable that the absorption of the products of their growth is a factor in the production of the general wasting.

Furthermore, the derangement of the gastro-intestinal functions so frequently present in these cases of phthisis adds another factor, to help explain the emaciation. The emaciation, however, is so rapid in certain cases that gastro-intestinal derangement cannot explain it, and perhaps plays only a small part, because the gastric symptoms are not as a rule marked.

Finally, the general lack of muscular exercise, which lasts over such a long period in chronic cases of pulmonary tuberculosis, produces a consequent functional atrophy of the muscular tissue, which is another factor in the picture of emaciation seen at the time of autopsy.

CYANOSIS AND EDEMA.

Cyanosis of lips,	None,	37	66 cases
	Slight,	26	
	Marked,	3	
Cyanosis of finger-tips,	None,	29	66 cases
	Slight,	32	
	Marked,	5	
General cyanosis of face,	None,	65	66 cases
	Marked,	1	
Edema of the ankles or legs,	None,	43	66 cases
	Slight,	20	
	Marked,	3	

SUMMARY FOR LAST TWO YEARS.

Cyanosis of lips,	None,	70	123 cases
	Slight,	47	
	Marked,	6	
Cyanosis of finger-tips,	None,	53	123 cases
	Slight,	60	
	Marked,	10	
General cyanosis of face,	None,	121	123 cases
	Marked,	2	
Edema of ankles or legs,	None,	89	123 cases
	Slight,	28	
	Marked,	6	

No summary for first two years.

Cyanosis of varying degree is present in a great number of cases. It is more frequent in the finger-tips than in the lips, and is very rare except as a local condition. In one case only is it recorded in the face.

Cyanosis, especially as seen in chronic cases of pulmonary tuberculosis, may be the result of various conditions. It is usually due to some lesion of the heart, of the respiratory system, or to some local condition of the blood-vessels in the immediate vicinity of the part affected. In our cases there is no doubt but the heart played at least some rôle. A study of the heart in our statistics shows that parenchymatous, and to a less extent interstitial, changes are frequent, and are the only common changes. It is to these, therefore, that we must look for an explanation of the cyanosis due to the heart. The common cardiac lesions usually associated with cyanosis in other cases, *i. e.*, valvular diseases of the heart, are present in only a very few of our cases, hence the general functional condition of the heart, rather than the functional sufficiency of the valves, is what we must consider.

On the clinical side the fagging heart is noted to a more or less marked degree in every case of pulmonary tuberculosis. This is undoubtedly caused by the disease in the respiratory tract and the general toxemia with its parenchymatous degenerations. Hence the cyanosis would appear to be due, at least in part, to passive congestion resulting from parenchymatous degeneration of the heart muscle and to the mechanical obstruction offered to

the circulation in the lungs. This passive congestion, due to weak heart action, is usually seen to a greater degree in the internal organs, like the liver, spleen, and kidney, especially the first, than it is in the finger-tips and lips.

Cyanosis of varying degree is frequently the result of disease of the respiratory system. This is especially true when the lung space is seriously diminished in extent, leading to a deficient aëration of the blood. In our cases this diminution of air space varies from one-half to three-fourths of the normal lung capacity. Considering this, therefore, it is surprising that cyanosis is not more frequent and more extensive than our statistics show. In this connection, however, it must not be forgotten that while the decrease in the lung tissue is in many cases extreme, the general body need for lung space and oxidation of blood in the terminal stages of tuberculosis is much less than that of an active or robust individual.

Local changes producing cyanosis, like thrombus, tuberculous glands pressing upon the venous system, and large tuberculous masses pressing upon the larger venous trunks, do not belong to the conditions which produce general cyanosis. Mention, however, should be made here of the vasomotor changes.

The vasomotor system is responsible for many of the symptoms in connection with chronic pulmonary tuberculosis. Among these may be mentioned the sweats, the hectic flush, and the pallor, as well as cyanosis and edema of the feet. All these are apparently the result of the toxemia acting directly on the vasomotor centers, or the result of actual degenerative lesions in the vessel walls produced by the toxic material in the circulation.

In cases of acute disseminated miliary tuberculosis cyanosis is generally noted to a greater extent than in ordinary chronic tuberculosis. This is caused by actual tuberculous lesions in many of the vessels, and to a less extent by toxic material acting upon the vasomotor center or upon the vascular walls.

POSITION OF BODY VISCERA.

Abdomen,.....	Normal position of viscera,.....	35	66 cases
	Abnormal position of viscera,.....	31	
Thorax,.....	Normal position of viscera,.....	60	66 cases
	Abnormal position of viscera,.....	6	
Pelvic viscera,.....	Normal position of viscera,.....	59	66 cases
	Abnormal position of viscera,.....	7	

SUMMARY FOR LAST TWO YEARS.

Abdomen,.....	Normal position of viscera,.....	78	123 cases
	Abnormal position of viscera,.....	45	
Thorax,.....	Normal position of viscera,.....	102	123 cases
	Abnormal position of viscera,.....	21	
Pelvic viscera,.....	Normal position of viscera,.....	109	123 cases
	Abnormal position of viscera,.....	14	

No summary for first two years.

During the past year the position of the various organs within the body cavities closely corresponds with our findings of previous years. In the thorax the mechanical pushing or pulling of an organ out of its proper place by disease of another organ accounts for the abnormal positions. In the abdomen, however, other changes play the important part in the displacement.

In the abdomen, the stomach and transverse colon are very frequently found much lower than normal. In the cases for the current year over 50% show slight to moderate ptosis of either the stomach or colon. This condition is common, and is noted in other diseases besides tuberculosis, though the percentage seems to be somewhat higher in tuberculosis. It appears to be mainly due to overstretching of the various ligamentous supports.

This stretching of ligamentous supports is found in the majority of wasting diseases in which the normal muscular activity is greatly below par. It is also seen in animals which have been confined to small pens, like the animals of zoölogical gardens, and is even very frequent and produces a condition of pendulous abdomen in the larger animals in which normal muscular development is very great.

In tuberculosis it is caused, in part at least, by the muscular inactivity of the individual, which becomes greatly lessened and

extends over a number of years. Moreover, this ptosis may give rise to some of the milder dyspeptic and intestinal disorders so common in tuberculosis; for it is often the only change to be found in the stomach and intestines.

HEIGHT OF DIAPHRAGM.

(66 Cases.)

Right. *Number of Cases.*		*Left.* *Number of Cases.*
1	3d interspace	0
11	4th rib	5
13	4th interspace	14
20	5th rib	20
11	5th interspace	16
3	6th rib	3
2	6th interspace	2
0	7th rib	1
5	not recorded	5

SUMMARY FOR LAST TWO YEARS.

(123 Cases.)

Right. *Number of Cases.*		*Left.* *Number of Cases.*
3	3d interspace	1
16	4th rib	11
25	4th interspace	21
43	5th rib	38
18	5th interspace	26
5	6th rib	12
3	6th interspace	3
2	7th rib	3
8	not recorded	8

No summary for first two years.

In regard to the height of the diaphragm, our findings for the current year are in every way similar to those of previous years, *i. e.*, the most common height is the fifth rib on both sides, and next in frequency the fourth interspace on the right and the fifth interspace on the left.

From a comparison with the normal it will be seen that our highest levels on both sides are about the width of an interspace below the normal, the right being usually higher than the left, as it is normally. This lower position of the diaphragm is difficult to explain. It is possible, however, that the extensive consolidation so frequently found in these cases causes sufficient com-

pensatory emphysema in the uninvolved portions of the lungs to produce it, or that the presence of the new material, inflammatory exudate, caseation, etc., may necessitate the lower position of the diaphragm in order to allow sufficient lung play during the respiratory movements.

PERICARDIUM.

Subepicardial adipose tissue,.....	Normal,.....	30	66 cases
	Slight,.....	33	
	Absent,.....	0	
	Excessive,.....	3	
Fluid in pericardium was recorded as.....	Normal,.....	44	66 cases
	Slight increase,.....	8	
	Excessive,.....	11	
	Clear blood,.....	1	
	Cloudy,.....	1	
	Fibrinous,.....	1	
Conditions recorded as.....	Normal,.....	61	66 cases
	General adhesions,.....	2	
	Visceral layer thickened, ...	3	

SUMMARY FOR FIRST TWO YEARS.

Conditions recorded as.....	Normal,.....	86	Out of 140 cases
	Local adhesions,.....	3	
	General adhesions,.....	2	
	Obliterated,.....	8	
	Thickened,.....	1	
	Milk spots,.....	28	
	Gelatinous degeneration of epicardial fat,.....	15	
	Miliary tubercles,.....	3	
	Acute inflammation,.....	1	
Fluid was recorded as.....	Normal,.....	24	140 cases
	Excessive,.....	28	
	Not recorded,.....	88	

SUMMARY FOR LAST TWO YEARS.

Subepicardial adipose tissue,.....	Normal,.....	48	123 cases
	Slight,.....	58	
	Absent,.....	9	
	Excessive,.....	6	
	Not recorded,.....	2	
Fluid in the pericardium was recorded as.....	Normal,.....	72	123 cases
	Slight increase,.....	12	
	Excessive,.....	33	
	Clear blood,.....	2	
	Cloudy,.....	1	
	Fibrinous,.....	1	
	Not recorded,.....	2	

The addition of the sixty-six cases autopsied during the current year to our statistics strengthens the statement made in last year's

report that tuberculosis of the pericardium is rare in cases of chronic pulmonary tuberculosis. In our tabulated cases of the autopsies of the Institute, now numbering two hundred and sixty-three, it will be seen that only three show a tuberculous condition of the pericardium. This becomes of even more interest when we consider that nearly all cases of chronic pulmonary tuberculosis show an extremely wide dissemination of the tubercle bacilli, since tubercles the size of pinheads are usually found throughout the majority of the organs, and yet we have failed to find them in the pericardium.

It is also remarkable that the tuberculous lesions in the neighboring organs do not extend to the pericardium by contiguity. In this regard it should be borne in mind that the left upper lobe overrides the pericardium, and this part of the lung is almost always the seat of extensive tuberculosis, and usually shows both the visceral and parietal pleura adjacent to it the seat of adhesions. Moreover, from the nature of these adhesions it is likely that they are the result of the underlying condition in the lung. Yet even in these cases the adjacent pericardium fails to show any change of either a tuberculous or simple inflammatory type. A satisfactory explanation for this immunity has not been found. Moreover, to describe it as a local tissue immunity is not satisfactory, since in acute general miliary tuberculosis tubercles are almost always found on the parietal and visceral pericardium.

It has been thought that the very great lymph-supply of the pericardium might, as it were, wash away the tubercle bacilli deposited on it, but the study of the draining lymphatics of the pericardium, *i. e.*, those situated at the bifurcation of the trachea, is still unsatisfactory, and this question is left unsettled. We can only say that the serous surface of the pericardium shows a special immunity in comparison with the serous surface of the pleura or peritoneum or even the meninges.

Milk Spots.—The finding of sclerotic, glistening, white, irregular areas (milk spots) on the surface of the pericardium is

common. Histologically, these areas show a slight thickening of the pericardium with fibrous tissue, which in many instances gives somewhat the staining reaction of mucoid degeneration. The individual fibrous tissue cells are greatly swollen and homogeneous. Some of these areas are possibly of post-mortem occurrence.

The clinical diagnosis of such lesions seems entirely impossible, because the thickening, while it exists, is slight and the surface is perfectly smooth, hence there would be in all likelihood no physical signs.

The cause of these areas has not been determined, though they are supposed by some to result from a previous acute pericarditis followed by chronic thickening which produces the opaque white color. This seems improbable, because there are no adhesions and it is scarcely likely that an acute pericarditis of this nature could occur so frequently without showing further changes. It is more probable that the origin will be explained by mucoid or some other form of degeneration of the superficial tissues of the pericardium.

HEART.

Color of muscle was recorded as	Normal	43	66 cases
	Pale	18	
	Dark	5	
Consistency of muscle was recorded as	Firm	55	66 cases
	Soft	11	
Condition of muscle was recorded as	Normal	41	66 cases
	Hypertrophy of both ventricles	1	
	Dilatation of both ventricles	11	
	Dilatation of right ventricle	3	
	Dilatation of left ventricle	2	
	Dilatation of both auricles	6	
	Dilatation of right auricle	2	
Valves were recorded as	Normal	51	Out of 66 cases
	Competent	61	
	Mitral thickened	8	
	Mitral atheromatous	4	
	Aortic atheromatous	1	
	Aortic thickened	6	
	Mitral stenosis	1	
	Tricuspid, thickened	6	
	Mitral regurgitation	2	
	Aortic regurgitation	1	

MICROSCOPIC EXAMINATION OF FIFTY CASES.

Normal,	7
Subepicardial fat increased,	1
Cloudy,	2
" slight,	2
" moderate,	1
Congestion, slight,	11
" moderate,	4
" marked,	2
Brown pigmentation of cells, marked,	7
" " " " moderate,	1
Hypertrophy of cells, slight,	4
" " " vacuolated,	1
Atrophy of cells,	5
Hypertrophy of fibers,	38
Increase of interstitial tissue,	13
Interstitial myocarditis,	4
" " marked,	1
Vessel walls thickened,	4
" " " and hyaline,	1

SUMMARY FOR FIRST TWO YEARS.

Size was recorded as	Normal,	53	140 cases
	Decreased,	13	
	Increased,	26	
	Not recorded,	48	
Color of muscle was recorded as	Normal,	14	140 cases
	Pale,	28	
	Dark,	1	
	Not recorded,	97	
Consistency of muscle was recorded as	Firm,	10	140 cases
	Soft,	31	
	Fatty,	6	
	Gelatinous fatty,	4	
	Not recorded,	89	
Condition of muscle was recorded as	Hypertrophy of both ventricles,	2	140 cases
	Hypertrophy of left ventricle,	6	
	Hypertrophy of right ventricle,	2	
	Dilatation of both ventricles,	6	
	Dilatation of right ventricle,	19	
	Dilatation of left ventricle,	1	
	Dilatation and hypertrophy,	1	
	Not recorded and normal,	103	
Valves were recorded as	Normal,	52	140 cases
	Mitral thickened,	8	
	Mitral sclerosed,	5	
	Mitral atheromatous,	3	
	Mitral and aortic thickened,	3	
	Aortic dilated,	2	
	Aortic constricted,	2	
	Aortic sclerosed,	7	
	Aortic atheromatous,	2	
	Aortic vegetations,	2	
	Not recorded,	54	

SUMMARY FOR LAST TWO YEARS.

Color of muscle was recorded as.....	Normal,.....	69	123 cases
	Pale,.....	47	
	Dark,.....	7	
Consistency of muscle was recorded as.....	Firm,.....	96	123 cases
	Soft,.....	27	
Condition of muscle was recorded as.....	Normal,.....	74	123 cases
	Hypertrophy of both ventricles,.....	4	
	Dilatation of both ventricles,.....	20	
	Dilatation of right ventricle,.....	6	
	Dilatation of left ventricle,.....	3	
	Dilatation of both auricles,.....	9	
	Dilatation of right auricle,.....	6	
	Dilatation and hypertrophy,.....	1	
Valves were recorded as.....	Normal,.....	95	Out of 123 cases
	Competent, ...	107	
	Mitral thickened,.....	15	
	Mitral atheromatous,.....	8	
	Aortic atheromatous,.....	2	
	Aortic thickened,.....	7	
	Mitral stenosis,.....	3	
	Tricuspid dilated (excessive),.....	2	
	Tricuspid sclerotic,.....	6	
	Mitral regurgitation,.....	2	
	Aortic regurgitation,.....	1	

The relation of the heart to chronic pulmonary tuberculosis is of interest on account of the various views expressed regarding it. It has been claimed that the common lesions of the heart valves, as seen in mitral or aortic valvular disease, are antagonistic to pulmonary tuberculosis. Moreover, this is usually explained on the ground that the passive hyperemia always to be found in these cases heals existing tuberculous lesions or prevents the implantation of the tubercle bacillus in the lungs. In the case of lesions of the pulmonary valve, however, the opposite condition, or anemia of the lung, is usually present, and the lungs are prone to tuberculous infection. From the observations made on the heart in the sixty-six cases autopsied during the year the following deductions may be made:

Tuberculosis of the heart: Tuberculosis of the heart is a rare condition. This is true not only of the pericardium, as previously mentioned, but also of the valves and of the heart muscle. In no case autopsied at the Institute have we found tuberculous lesions in the heart. There are, however, non-tuberculous

lesions secondary to the tuberculosis of the lungs, which will be considered later.

Size: It has been stated that the heart is abnormally small in tuberculosis. This is not substantiated by the comparison of the weights and measurements of the heart and of the individual in our statistics. Our table shows that the heart in pulmonary tuberculosis is large in proportion to the size of the body at the time of autopsy, and large for the size of the body considered from the standpoint of the standard weight, or even in many instances of the highest weight. This increase in size of the heart is probably a secondary change brought about indirectly by the excessive work thrown on the heart on account of the extensive pulmonary lesions. This enlargement is general and is due to dilatation and slight hypertrophy of the muscular wall. In our tables this dilatation and hypertrophy have not been recorded except when the condition was moderate or excessive.

From the clinical side, the superficial dullness of the heart should be larger than that found in the normal individual, because the diseased lung tissue retracts from its normal position and thereby exposes a greater surface of the heart directly beneath the chest wall. The base, and especially the left border of the heart, however, should be difficult to determine clinically, because the lung tissue in the immediate vicinity is so frequently solidified.

Valvular defects: Our tables show that the valve leaflets were functionally disabled in four cases (6.06%). In all of these the lesions in the lungs did not materially differ from those usually found, so that in these four cases the passive congestion due to the heart condition did not prevent the extension of the tuberculous process in the lungs.

Heart muscle: The heart muscle is in the great majority of cases of a pale normal color and of firm consistency. Under the microscope the muscle fibers are frequently hypertrophied, which is to a certain extent accounted for by the increased strain on the

heart due to the pulmonary lesions. It is surprising that changes in the heart muscle are not more frequently found than our tables indicate, because a number of cases show by the cyanosis, edema, and passive congestion of the various organs that the heart, at least in the last stages of the disease, is unable to properly do its work.

Vascular system: In considering the vessels, and especially the large vessels, the infrequency of atheroma is striking. While small atheromatous plaques are common, extensive calcareous deposits are rare. Thickening of the arterial walls (fibroid thickening) is very often noted, and this is especially true of some of the smaller vessels seen in the study of the various organs histologically.

Calcareous deposits are most frequently met in the larger arteries of the thyroid gland and in some of the uterine arteries, and next in frequency in some of the arteries of the kidney. In the kidney, however, thickening without calcification is more common. The calcareous deposits and general thickening of the vessels of the thyroid gland seem to go hand in hand with the fibroid condition so often seen in this organ.

PLEURA.

		Left.		*Right.*	
Condition was recorded as		5,	Normal throughout,	10	
		Left.		*Right.*	
Adhesions were recorded as ..	Extreme apex,	5,	None,	10	66 cases
		2,	Recent,	2	
		2,	Recent, posteriorly,	1	
		2,	Recent and old,	1	
		28,	Old, location not definable,	17	
		4,	Old, anteriorly,	1	
		10,	Old, posteriorly,	4	
		12,	Obliterating,	29	
		1,	Not recorded,	1	
		Left.		*Right.*	
	Rest of upper lobe,	5,	None,	11	66 cases
		11,	Localized, old,	4	
		12,	Obliterating,	29	
		5,	Recent,	0	
		4,	Recent and old,	1	
		1,	Localized, recent,	3	
		27,	General, old,	16	
		0,	Pneumothorax,	1	
		1,	Not recorded,	1	

PLEURA.—(*Continued.*)

			Right.	
Adhesions were recorded as ..	Middle lobe,..	None,.....	27	66 cases
		Obliterating,.....	29	
		Recent,.....	1	
		Recent and old,.....	1	
		Old,.....	5	
		Pyothorax,.....	2	
		Pneumothorax,.....	1	
		Left.	*Right.*	
	Lower lobe,...	24,....None,.....	25	66 cases
		4 ....Recent,.....	1	
		8,....Localized, old,.....	0	
		14,....General, old,.....	7	
		12,....Obliterating,.....	29	
		1,....Localized, recent,.....	0	
		1,....Localized, recent and old,.	1	
		2,....Pyothorax,.....	2	
		0,....Pneumothorax, ...	1	
		Left.	*Right.*	
Exudate,.....		48,....Normal,.....	34	66 cases
		4,....Increased,.....	0	
		2,....Purulent, ...	2	
		12,....None (pleura obliterated),	29	
		0,....Fibrinous,.....	1	

SUMMARY FOR FIRST TWO YEARS.

		Left.	*Right.*	
Condition was recorded as.....		5,.....Normal throughout,.....	5	
		Left.	*Right.*	
Adhesions were recorded as ..	Apex,.....	5,....None,.....	5	140 cases
		10,....Recent,.....	3	
		19,....Dense,.....	13	
		18,....Recent and dense,.....	2	
		49,....Not tabulated (as to recency and density),.....	46	
		37,....Obliterating,.....	31	
		2,....Not recorded,.....	40	
		Left.	*Right.*	
	Rest of upper lobe,.....	5,....None,.....	17	140 cases
		11,....Recent,.....	6	
		19,....Dense,.....	11	
		4,....Recent and dense,.....	1	
		36,....Not tabulated (as to recency and density),.....	34	
		37,....Obliterating,.....	31	
		28,....Not recorded,.....	40	
			Right.	
	Middle lobe,..	None.	37	140 cases
		Recent, ...	5	
		Dense, ...	8	
		Not tabulated (as to recency and density),.....	32	
		Obliterating, ...	31	
		Not recorded, ...	27	

Adhesions were recorded as.....Lower lobe,...

Left.		*Right.*	
33,	None,	46	140 cases
11,	Recent,	5	
13,	Dense,	9	
4,	Recent and dense,	0	
25,	Not tabulated (as to recency and density),	27	
37,	Obliterating,	31	
17,	Not recorded,	22	

Condition was recorded as.....

Left.		*Right.*	
5,	Normal,	5	Out of 140 cases
37,	Obliterating,	31	
1,	Pyothorax,	6	
5,	Pyopneumothorax,	5	
1,	Pneumothorax,	4	
8,	Serous effusion,	14	
1,	Acute fibrinous pleurisy,	0	
0,	Serous effusion, sacculated,	1	
0.	Calcified,	1	

SUMMARY FOR LAST TWO YEARS.

Left.		*Right.*
11,	Normal throughout,	15

Condition was recorded as.....

Adhesions were recorded as ..

Extreme apex,

Left.		*Right.*	
16,	None,	16	123 cases
3,	Recent,	3	
3,	Recent, posteriorly,	2	
2,	Recent and old,	2	
46,	Old, location not definable,	33	
6,	Old, anteriorly,	2	
13,	Old, posteriorly,	9	
33,	Obliterating,	52	
0,	Thickened,	2	
0,	Thickened, old,	1	
1,	Not recorded,	1	

Rest of upper lobe,

Left.		*Right.*	
14,	None,	19	123 cases
33,	Localized, old,	38	
34,	Obliterating,	52	
7,	Recent,	3	
4,	Recent and old,	2	
2,	Localized, recent,	2	
0,	Localized, recent and old,	1	
28,	General,	0	
0,	Pyothorax,	3	
0,	Pneumothorax,	1	
0,	Pyopneumothorax,	1	
1,	Not recorded,	1	

Middle lobe,..

	Right.	
None,	49	123 cases
Localized, old,	4	
Obliterating,	52	
Recent,	2	
Recent and old,	2	
Old,	6	
Pyothorax,	6	
Pyopneumothorax,	1	
Pneumothorax,	1	

PLEURA.—(*Continued.*)

Adhesions were recorded as .....Lower lobe,...

Left.		*Right.*	
45,	None,	46	123 cases
4,	Recent,	2	
19,	Localized, old,	7	
14,	General, old,	0	
0,	Old,	9	
2,	Localized, recent,	1	
2,	Localized, recent and old,	0	
34,	Obliterating,	52	
3,	Pyothorax,	5	
0,	Pyopneumothorax,	1	

Exudate was recorded as.....

Left.		*Right.*	
74,	Normal,	60	123 cases
9,	Increased,	2	
4,	Purulent,	6	
2,	Sacculated,	1	
0,	Bloody,	1	
0,	Fibrinous,	1	
34,	None (pleura obliterated),	52	
0,	Edema,*	1	

* Case of obliterated pleura with edema of adhesions.

Cases of chronic pulmonary tuberculosis almost always show extensive pleural adhesions, usually old, but sometimes recent, distributed throughout the pleural cavities. In this distribution the older and more numerous adhesions are commonly located in the region of the apex, and next in frequency over the upper lobes, while the more recent and usually scattered adhesions are found lower down in the cavity.

As was stated in last year's report, the older and firmer adhesions are most frequently encountered posteriorly, 2 to 5 cm. below the apex, toward the posterior axillary line. In cases dying of other diseases than tuberculosis which show the presence of old tuberculous lesions in the lung, extensive old adhesions are found most commonly in the same situation, over both the right and left upper lobes, though more frequently the former. These findings suggest that the tuberculous lesion begins in this part of the lung.

During the year it has been found that pleural adhesions cannot be diagnosed clinically in the great majority of cases, and that

our usual physical signs of pleural adhesions are of little value. This is especially evident when the actual findings on the autopsy table are compared with definite markings on the chest. Further, in several cases after distinct friction sounds had been localized to certain areas on the chest wall the autopsy showed the visceral as well as the parietal pleura to be pale, glistening, and smooth,—in other words, normal,—and the sounds heard clinically a few days before death remained unexplained by the autopsy.

Pleural effusions: Marked serous pleural effusions are rarely observed in our cases. This is rather surprising when we consider the general literature of pleural effusions and the supposed relation which they bear to pulmonary tuberculosis. Moreover, the fact that the underlying lung tissue is so commonly tuberculous in these cases, and that the tuberculous process actually extends to the visceral surface, would lead one to expect that, at least in a certain number, serous effusions would result. Nevertheless, though the pleura is usually damaged, the condition is one of a chronic inflammatory nature, associated with adhesions, but not effusion. In addition, we believe that these adhesions are not preceded by an effusion, but result from a dry pleurisy which is of a plastic nature or which rapidly progresses to organization.

LUNGS.

Condition in the 66 cases autopsied was recorded as, ...

	Left.		*Right.*
Apex,.....	37,	Cavities, large,.....	28
	4,	Cavities, small,.....	6
	2,	Cavities, communicating,.....	1
	2,	Cavities, small and numerous,.....	0
Rest of upper lobe, ..	*Left.*		*Right.*
	34,	Cavities, large,.....	30
	5,	Cavities, small,.....	11
	9,	Cavities, small and numerous, ...	8
	6,	Cavities, communicating,.....	8
	3,	Cavities, large and small,.....	3
	4,	Cavities, large and numerous, ...	1
	11,	Fibroid,.....	18
	6,	Miliary tubercles, few,.....	11
	11,	Miliary tubercles, many,.....	14
	2,	Miliary tubercles, coalesced, few, ..	4
	18,	Miliary tubercles, coalesced, many,	10

LUNGS.—(*Continued.*)

Condition in the 66 cases autopsied was recorded as,

	Left.		*Right.*
Rest of upper lobe,	13,	Bronchopneumonia,	14
	33,	Broncho-caseous pneumonia,	30
	3,	Healed lesions,	9
	3,	Collapsed,	1
	0,	Gangrenous,	1
	6,	Edema,	7
	5,	Anthracosis,	3
	0,	Emphysema,	2
	15,	Bronchial walls normal,	18
	51,	Bronchial walls thickened,	48
	2,	Bronchial walls dilated,	4

		Right.
Middle lobe,	Cavities, large,	5
	Cavities, small,	4
	Cavities, communicating,	5
	Cavities, small and numerous,	9
	Cavities, large and small,	1
	Fibroid,	6
	Miliary tubercles, few,	17
	Miliary tubercles, many,	16
	Miliary tubercles, coalesced, few,	4
	Miliary tubercles, coalesced, many,	21
	Bronchopneumonia,	14
	Broncho-caseous pneumonia,	19
	Healed lesions,	3
	Collapsed,	1
	Edema,	9
	Anthracosis,	3
	Emphysema,	2
	Bronchial walls normal,	30
	Bronchial walls thickened,	36
	Bronchial walls dilated,	4

	Left.		*Right.*
Lower lobe,	14,	Cavities, large,	9
	5,	Cavities, small,	6
	4,	Cavities, communicating,	6
	11,	Cavities, small and numerous,	5
	1,	Cavities, numerous and large,	1
	0,	Cavities, large and small,	1
	5,	Fibroid,	4
	14,	Miliary tubercles, few,	14
	19,	Miliary tubercles, many,	23
	5,	Miliary tubercles, coalesced, few,	5
	28,	Miliary tubercles, coalesced, many,	28
	13,	Bronchopneumonia,	16
	23,	Broncho-caseous pneumonia,	12
	1,	Healed lesions,	4
	3,	Collapsed,	2
	14,	Edema,	9
	3,	Anthracosis,	3
	0,	Emphysema,	2
	28,	Bronchial walls normal,	34
	38,	Bronchial walls thickened,	32
	2,	Bronchial walls dilated,	1
	0,	Bronchiectasis,	1

SUMMARY FOR LAST TWO YEARS.

Condition in the 123 cases autopsied was recorded as,

Apex,

Left.		*Right.*
61,	Cavities, large,	53
13,	Cavities, small,	11
5,	Cavities, communicating,	5
2,	Cavities, small and numerous,	1

Rest of upper lobe,

Left.		*Right.*
65,	Cavities, large,	57
15,	Cavities, small,	20
10,	Cavities, small and numerous,	11
20,	Cavities, communicating,	21
4,	Cavities, large and small,	3
4,	Cavities, numerous and large,	1
23,	Fibroid,	31
10,	Miliary tubercles, few,	19
27,	Miliary tubercles, many,	28
4,	Miliary tubercles, coalesced, few,	5
27,	Miliary tubercles, coalesced, many,	21
28,	Bronchopneumonia,	36
58,	Broncho-caseous pneumonia,	53
4,	Healed lesions,	9
5,	Collapsed,	4
10,	Edema,	13
6,	Anthracosis,	6
3,	Emphysema,	4
0,	Gangrenous,	1
28,	Bronchial walls normal,	34
95,	Bronchial walls thickened,	89
8,	Bronchial walls dilated,	10

Middle lobe,

Cavities, large,	12
Cavities, small,	7
Cavities, communicating,	12
Cavities, small and numerous,	10
Cavities, large and small,	1
Fibroid,	8
Miliary tubercles, few,	31
Miliary tubercles, many,	30
Miliary tubercles, coalesced, few,	8
Miliary tubercles, coalesced, many,	33
Bronchopneumonia,	34
Broncho-caseous pneumonia,	40
Healed lesions,	3
Collapsed,	4
Edema,	20
Anthracosis,	5
Emphysema,	7
Bronchial walls normal,	54
Bronchial walls thickened,	69
Bronchial walls dilated,	8

Lower lobe,

Left.		*Right.*
24,	Cavities, large,	17
9,	Cavities, small,	11
11,	Cavities, communicating,	11
13,	Cavities, small and numerous,	8
1,	Cavities, numerous and large,	1
0,	Cavities, large and small,	1
10,	Fibroid,	5

LUNGS.—(*Continued.*)

		Left.		*Right.*
Condition in the 123 cases autopsied was recorded as, ...	Lower lobe,.....	29,....	Miliary tubercles, few,.....	35
		36,....	Miliary tubercles, many,.....	38
		8,....	Miliary tubercles, coalesced, few,..	10
		47,....	Miliary tubercles, coalesced, many,.	40
		35,....	Bronchopneumonia,.....	36
		47,....	Broncho-caseous pneumonia,.....	32
		2,....	Healed lesions,.....	5
		5,....	Collapsed,.....	5
		24,....	Edema,.....	22
		4,....	Anthracosis,.....	5
		1,....	Gangrene,.....	0
		3,....	Emphysema,.....	4
		51,....	Bronchial walls normal,.....	65
		71,....	Bronchial walls thickened, ...	58
		5,....	Bronchial walls dilated,.....	3
		0,....	Bronchial walls tortuous, ...	2
		0,....	Bronchiectasis,.....	1

Summary for first two years incomplete.

During the current year much the same conditions have been found in the lungs post-mortem as were found in previous years. This was, of course, to be expected, since the general character of our cases varies but little, though we see both extremes of involvement.

It will be seen by the tables that numerous cavities, either large or small, are the rule. Since the beginning of the current year we have endeavored to localize these cavities at the apex and in the upper lobe, as situated anteriorly or posteriorly. We have been able to do this only partially, because in the majority of instances the cavities were so large that localization to an anterior or a posterior position was impossible.

The following are the data as far as location could be made out: Of the thirty-seven large cavities at the left apex, five were anterior, seven posterior, and twenty-five not particularly localized; of the twenty-eight large cavities at the right apex, two were antero-lateral, four posterior, and twenty-two not particularly localized. Of the four small cavities at the left apex, one was anterior and three not particularly localized; of the six small cavities at the right apex, one was anterior, one posterior, and four not particularly localized.

Of the thirty-four large cavities in the left upper lobe below the apex, three were anterior, one posterior, and thirty not particularly localized; of the thirty large cavities in the right upper lobe below the apex, two were posterior and twenty-eight not particularly localized; of the eleven small cavities in the right upper lobe below the apex, two were posterior and nine not particularly localized. Of the four cases in which there were large and numerous cavities in the left upper lobe below the apex, in one they were anterior and in three they were not particularly localized.

The table shows, therefore, that in the few cases in which it was possible to localize them the cavities at the apex were found more frequently posteriorly than anteriorly. In this connection it is worth while recalling the constant occurrence of old pleurisy at the apex posteriorly, so that, considering the condition of the pleura and the position of the cavities in the lungs, it would seem that the tuberculous process usually begins in the posterior part of the apex. Moreover, our observations of both last year and the current year show that, taking the lung as a whole, the tuberculous process which starts in the upper lobes in the neighborhood of the apex advances slowly downward, and usually involves the left lung more than the right, the right lower lobe being usually the least involved. The right middle lobe shows, as a rule, an acute or subacute pneumonic process with considerable caseation.

The description of the various lesions found in the lungs at autopsy was given fully in last year's report, as well as the description of the general involvement of the lungs as a whole. It does not seem advisable, therefore, to again describe this general pathological picture.

Clinically, the diagnosis of the various lesions described depends upon the finding of definite physical signs which would appear to the pathologist to be greatly modified by the varying conditions of the lung tissue about them, and hence at times the diagnosis must be rendered very difficult.

To illustrate, let us consider a cavity, in connection with which

may occur different conditions in the chest wall, in the pleura, in the overlying lung tissue, in the lung tissue immediately surrounding, and in the cavity itself and its contents.

Chest wall: Advanced and moderately advanced cases of pulmonary tuberculosis show varying degrees of emaciation, due usually to the disappearance of the subcutaneous fat and to atrophy of the chest muscles. A thin chest wall will, of course, give more marked physical signs of the underlying condition than a thick chest wall. Hence there may be a variation in the physical signs due to the chest wall.

Pleura: In the majority of cases of pulmonary tuberculosis pleural adhesions are present, accompanied by more or less thickening of the parietal as well as the visceral pleura. When the adhesions are few and scattered, the thickness of the pleura is not materially increased; when the pleura is completely adherent, however, or even in cases of numerous adhesions, the pleural membrane may be increased to 1 or 1.5 cm. in thickness. Percussion or auscultation over a lung the pleura of which is thickened to such a degree must show modified sounds as compared with a lung over which the pleura is normal, for the underlying tissue is not only a greater distance from the chest wall, but is covered by a very thick layer of dense fibrous tissue.

Overlying lung tissue: The condition of the lung tissue between the cavity and the visceral pleura varies greatly according to the proximity of the cavity to the pleura. Sometimes when the cavity is deeply seated the overlying lung tissue is markedly emphysematous. This emphysema may be agonal or may have existed only a short time before death; in other cases, however, it is a compensatory emphysema, and this is especially true when the lung involvement is extensive. In other instances the overlying lung tissue may be normal in appearance or only very slightly congested. Again, and by far the most common, the overlying lung tissue between the cavity and the pleura may be completely consolidated. This is especially true when the cavity is in the

upper lobes and when the disease is running an acute or a subacute course. Sometimes this consolidation, though marked, is separated from the cavity by a distinct area of air-bearing tissue. The physical signs over such a condition are undoubtedly modified by these various conditions.

Lung tissue surrounding the cavity: If the cavity is large, the surrounding lung tissue almost always shows consolidation for at least 1 cm., and in the great majority of cases even more than this. This consolidation may be of a pneumonic character, in which the lung tissue shows varying stages, from the gray to the grayish-red or the yellow stage of pneumonia, or it may be distinctly caseous, which would indicate that the cavity was enlarging. In other cases, however, especially the very chronic ones, the surrounding lung shows an excess of fibrous tissue. In cases in which the process is healing or is not advancing, the consolidation immediately around the cavity may extend for only 2 or 3 mm. In these cases the zone beyond the consolidation generally consists of normal air-bearing or slightly congested lung tissue.

Cavity and its contents: The cavities in chronic cases of pulmonary tuberculosis are in the great majority of instances irregular in outline. They vary from the size of a pea up to the size of the whole lobe. Frequently they are distinctly loculated. The contents vary from thick caseous material to watery muco-pus, and usually consist of the latter. The former is found when cavities are just forming and have not completely emptied themselves. Rarely is a cavity found "filled." The amount of material in a cavity must vary from time to time, hence the physical signs over a cavity would be modified by the amount of fluid contained therein.

In cavity cases the conditions vary in different cases, and even at different times in the same case, so that the percussing finger, tapping over a cavity situated in the central part of the lung, may at the same time be percussing over a thickened pleura, bronchopneumonic areas of consolidation, normal air-bearing tissue,

or a thick- or thin-walled cavity either partly filled or empty. Moreover, the conditions are often further complicated by the presence of numerous cavities.

LARYNX.

Larynx was recorded as.....	Normal,.....	30	Out of 66 cases
	Infiltrated,.....	12	
	Congested,.....	6	
	Ulcerated,.....	26	
	Not recorded,.....	2	

MICROSCOPIC EXAMINATION OF THIRTY CASES.

Normal,.....	3
Congestion slight,.....	3
Congestion moderate,.....	1
Congestion marked,.....	1
Hyperplasia of epithelium,.....	4
Increase of fibrous tissue in submucosa,.....	8
Edema,.....	1
Infiltration of submucosa without tubercles,.....	2
Tuberculosis,.....	19

SUMMARY FOR LAST TWO YEARS.

Larynx was recorded as.....	Normal,.....	56	Out of 123 cases
	Infiltrated,.....	13	
	Congested,.....	11	
	Congested and ulcerated,.....	5	
	Ulcerated,.....	37	
	Ulcerated, with general infiltration, ...	3	
	Not recorded,.....	8	

No summary for first two years.

In the sixty-four cases in which the condition of the larynx was recorded, it was normal in 46.9% and showed lesions varying from congestion and infiltration to distinct ulceration in 53.1%. In 40.6% definite ulceration was noted, which is a higher percentage than last year, though this is probably only a coincidence.

The theory that tuberculosis of the larynx originates through the blood and not by implantation of tubercle bacilli on the surface is difficult to prove. In a certain percentage of cases, however, we find submucous tubercles without evidence of a break in the superficial epithelium. Yet even this is not absolute proof, because other normal mucous membranes allow the passage of tubercle bacilli through them.

In the cases tabulated under "infiltrated" no ulceration was

present, but the superficial epithelium showed proliferation to such an extent that a distinct elevation of the mucous membrane was present. In some of these cases the proliferation was apparently caused by the irritation of an underlying submucous tubercle; in others, however, no submucous tubercles were found.

TRACHEA.

Condition of the trachea was recorded as.....	Normal,.....	38	Out of 66 cases
	Ulcerated,.....	15	
	Congested,.....	14	
	Infiltrated,.....	1	
	Gangrenous,.....	1	

MICROSCOPIC EXAMINATION OF FOUR SPECIAL CASES.

Ulcerative tuberculosis,.....	2
Tubercles of mucous membrane, ...	2
Round-cell infiltration,.....	1

SUMMARY FOR LAST TWO YEARS.

Condition of the trachea was recorded as.....	Normal,.....	64	Out of 123 cases
	Ulcerated,.....	27	
	Congested,.....	30	
	Infiltrated,.....	2	
	Gangrenous,.....	1	
	Not recorded,.....	3	

No summary for first two years.

Practically the same conditions were found in the trachea as noted last year. The ulcerative condition in the larynx was accompanied by ulceration of the trachea in 57% of the cases.

In one case the finding was unique. This showed not only a tuberculous but also a gangrenous process, the latter being undoubtedly secondary. Practically the whole mucous membrane and wall of the trachea were gangrenous, being of a dirty, greenish color and emitting a foul odor. In the upper part many of the tracheal rings had completely ulcerated through, so that they stood out as small bands or rings completely isolated from the mucous membrane.

ESOPHAGUS.

Condition was recorded as....	Normal,.....	58	66 cases
	Diverticulum,.....	3	
	Erosions, post-mortem,.....	2	
	Tubercle-like nodules,.....	2	
	Scar,.....	1	

The esophagus showed no serious pathological condition. In three cases there was a slight superficial diverticulum extending about 3 mm. in depth, but the pathological condition underlying this could not be determined. One case showed a small scar in which the cicatrix was completely fibrosed, apparently the result of some condition other than tuberculosis. In two cases small elevations of a whitish color without inflammation and resembling macroscopically miliary tubercles were observed. Histological examination showed a hyperplasia of the epithelial layer whereby the number and size of the cells in the epithelium were greatly increased. There was no evidence, however, of the process being of a tuberculous or inflammatory nature. In two cases post-mortem erosions were observed.

The remaining fifty-eight cases showed the mucous membrane normal throughout, with the exception of the lower third, which showed in many cases a slight greenish discoloration probably due to post-mortem changes. As in previous years no distinct tuberculous lesions, such as ulceration, were noted.

STOMACH.

Shape was recorded as.....	Normal,.....	60	66 cases
	Hourglass contraction,.....	4	
	Contracted,.....	2	
Position was recorded as.....	Normal,.....	44	66 cases
	Gastroptosis,.....	22	
Local abnormalities were recorded as.....	Normal,.....	48	66 cases
	Ulceration,.....	1	
	Pigmentation,.....	1	
	Congestions,.....	16	

MICROSCOPIC EXAMINATION OF TWENTY-FOUR CASES.

Normal,.....	1
Congestion slight,.....	7
Congestion moderate,.....	2
Congestion marked,.....	2
Subacute gastritis,.....	5
Chronic gastritis,.....	10
Chronic gastritis, slight,.....	3
Chronic gastritis, moderate,.....	2

SUMMARY FOR LAST TWO YEARS.

Shape was recorded as.....	Normal,.....	109	123 cases
	Hourglass contraction,.....	9	
	Contracted,.....	4	
	Funnel-shaped,.....	1	

Position was recorded as.....	Normal,.....	94	123 cases
	Gastroptosis,.....	29	
Local abnormalities were recorded as.....	Tubercles, subserous,.....	3	Out of 123 cases
	Ulceration,.....	2	
	Pigmentation,.....	2	

No summary for first two years.

In the cases of the current year the stomach showed no distinct tuberculous lesions; this corresponds with our findings in previous years. Moreover, histological study taking in at least two parts of the stomach wall failed to show microscopic or submucous tubercles.

The only gross condition found was a dropping or ptosis of the stomach. This was quite common, and has been considered elsewhere under "positions of abdominal viscera." In the majority of cases the gross appearance of the stomach is practically normal. The mucous membrane is usually covered by considerable mucus, and here and there shows post-mortem erosions with irregular areas of congestion. Histologically, a mild grade of subacute or chronic gastritis may be found, though this does not explain the marked gastric symptoms often present antemortem. These dyspeptic symptoms must be for the most part functional in nature. One observer has noted them in 74.6% of cases examined and suggests that their cause is toxic.

SMALL INTESTINE.

	Jejunum.		*Ileum.*	
Condition was recorded as	16,....	Normal,.....	12	Out of 66 cases
	20,....	Tuberculous ulcers,.....	36	
	25,....	Congestion,.....	22	
	1,....	Perforation,.....	3	
	6,....	Tubercles,.....	8	

MICROSCOPIC EXAMINATION OF FORTY-SEVEN CASES.

Congestion slight,.....	9
Congestion moderate,.....	2
Congestion marked,.....	9
Enteritis, subacute,.....	4
Enteritis, subacute catarrhal, ...	4
Enteritis, chronic,.....	32
Submucous increase of fibrous tissue,.....	3
Non-tuberculous ulceration,.....	1
Tuberculosis,.....	25
Submucous tubercles, ...	5
Submucous tubercles and edema,.....	1
Subserous tubercles,.....	4
Amyloid,.....	4

SUMMARY FOR FIRST TWO YEARS.

Condition was recorded as	Normal to external examination only,	22	Out of 140 cases
	Normal to external and internal examination,	57	
	Tuberculous ulcers in ileum,	6	
	Tuberculous ulcers in jejunum,	2	
	Tuberculous ulcers, location not recorded,	35	
	Miliary tubercles in ileum,	1	
	Miliary tubercles, location not recorded,	1	
	Congestion,	8	
	Perforation,	3	
	Tænia saginata,	1	
	Diverticulum,	1	

SUMMARY FOR LAST TWO YEARS.

Jejunum.		*Ileum.*	
Condition was recorded as	17, Normal,	13	Out of 123 cases
	27, Tuberculous ulcers,	68	
	65, Congestion,	62	
	6, Tubercles,	8	
	2, Perforation,	3	
	Tuberculous ulcers, location not recorded as jejunum or ileum,	18	

In tabulating the work of the year the small intestine was divided into its three anatomical divisions—the duodenum, jejunum, and ileum. The duodenum, with the exception of being frequently bile-stained, was always normal.

Lesions found in the jejunum differ materially from those in the ileum. In the jejunum areas of congestion are, as a rule, more marked, while ulceration is less marked. The number of ulcers in the jejunum increases as the ileum is approached, and in the ileum further increases toward its lowest part. The jejunum showed ulcers in 30.30% of the cases, while the ileum showed ulcers in 54.55%. Perforation occurred in the jejunum once and in the ileum three times. Moreover, the ulceration in the ileum was far more extensive, in that the ulcers were larger, deeper, and more frequently associated with localized peritonitis than in the jejunum.

Much has been written on the character of the tuberculous lesions of the intestine throwing light on the mode of entrance of the tubercle bacillus into the lungs. It is impossible to state from our cases whether the intestinal tuberculosis preceded or followed the lesions in the lungs. From the size and extent of the lesions in the intestines as compared with those in the lungs (this com-

parison made solely on the extensiveness of the lesions) we would suppose that the pulmonary lesions were the older, but as the size of the lesions in the various organs differs naturally according to the organ involved, it is impossible to make this more than a supposition. It is equally difficult to state the age of the lesion from the involvement of the draining mesenteric glands, since it is well known that tuberculosis usually causes rapid enlargement and rapid caseation of the lymphatic glands. Moreover, though caseation accompanied by induration due to an increase in fibrous tissue indicates a more chronic condition, and therefore usually longer existence than caseation which is still soft, we have no means of telling the age with any degree of accuracy.

LARGE INTESTINE.

Condition was recorded as — Out of 66 cases

Cecum.		*Colon.*
12,	Normal,	17
16,	Congestion,	16
4,	Tubercles,	0
34,	Ulcers not tabulated as to few or many,	27
0,	Ulcers, few (in region of ileocecal valve),	19

SUMMARY FOR FIRST TWO YEARS.

Condition was recorded as — 140 cases

Normal,	67
Tubercles,	3
Ulcers not tabulated as to few or many,	9
Ulcers, few,	3
Ulcers, many,	2
Ulcers, small and few,	1
Not recorded,	55

SUMMARY FOR LAST TWO YEARS.

Tubercles, not localized,	4
Ulcers, few, not localized,	2
Ulcers, many, not localized,	112
Ulcers, small and few, not localized,	4

Condition was recorded as — Out of 123 cases

Cecum.		*Colon.*
18,	Normal,	23
4,	Tubercles,	0
34,	Ulcers not tabulated as to few or many,	27
8,	Ulcers, few,	20
5,	Ulcers, many,	2
2,	Ulcers, small and few,	1
0,	Ptosed,	2
23,	Congestion,	23
3,	Pigmentation,	3

Cecum and colon not divided last year.

In this report the large intestine has been divided into the cecum and colon. In regard to the location of the lesions in the large intestine, the reverse is true of what has been said of the small intestine, namely, that the upper part of the large intestine is usually more extensively diseased than the lower part. Our tables show the cecum normal in only 18.18% of the cases, the colon normal in 25.76%; and tuberculous ulceration in the cecum in 51.52% and the colon in 69.69%.

"Ulcers few in the region of the ileocecal valve" were noted in nineteen cases. This region of the ileocecal valve, in both the small intestine and cecum, is a favorite seat for tuberculous ulceration. Even in cases in which ulceration was not found elsewhere throughout the whole intestinal tract, one or two small ulcers were usually encountered here. In our cases the head of the cecum close to the ileocecal valve shows ulceration more commonly than the lower part of the ileum. As was stated in last year's report, the reason for the frequency of ulceration and submucous tubercles in this region is probably the great lymphoid collections present in the mucous membrane as well as the stagnation of the intestinal contents. The draining lymphatic glands are frequently enlarged and distinctly caseous, and are at times the only glands macroscopically enlarged.

We must not forget, in connection with tuberculosis of the intestinal tract, the occurrence of a chronic hyperplastic or fungoid condition sometimes seen at the head of the cecum. This process has attracted the attention of surgeons because the physical signs have sometimes led to an operation for cancer. Moreover, even at the time of operation the surgeons have been misled into the belief that the process was cancerous because of the general thickening of the bowel wall without distinct ulceration. In the majority of cases the lymphatic glands which drain this part and are situated in the region of the ileocecal valve are distinctly caseous, and when found in such a condition are indicative of the

true condition, namely, tuberculosis. In our cases this form of tuberculosis has been seldom observed.

The suggestion has been made that this form of tuberculosis is due to the bovine tubercle bacillus, but there are no positive data to prove this. The process is almost always considered secondary to tuberculous lesions elsewhere in the body.

Besides the tuberculous lesions, the intestines usually show a subacute or chronic catarrhal process, with or without interstitial changes.

APPENDIX.

Condition was recorded as			
	Normal,	37	Out of 66 cases
	Congestion,	5	
	Adhesions,	16	
	Removed,	2	
	Tubercles,	5	
	Tuberculous ulcers,	4	
	Perforation,	1	
	Sacculated,	1	
	Acute inflammation,	2	

MICROSCOPIC EXAMINATION OF TWENTY-EIGHT CASES.

Congestion slight,	4
Congestion moderate,	1
Congestion marked,	2
Appendicitis, catarrhal,	4
Appendicitis, subacute,	3
Appendicitis, chronic,	7
Appendicitis, obliterating,	2
Increase of fibrous tissue, submucosa,	6
Increase of fibrous tissue, submucosa, marked,	1
Decrease of tubular glands, mucosa,	1
Atrophy of lymphoid glands,	10
Tuberculosis,	18

SUMMARY FOR FIRST TWO YEARS.

Condition was recorded as			
	Normal to external examination only,	12	140 cases
	Normal to external and internal examination,	49	
	Congestion,	2	
	Appendicitis,	2	
	Adhesions,	21	
	Fecal concretions,	2	
	Tuberculous ulcers,	44	
	Tubercles,	4	
	Removed by operation,	1	
	Sacculated,	1	
	Not recorded,	2	

SUMMARY FOR LAST TWO YEARS.

Condition was recorded as		Out of 123 cases
	Normal, 74	
	Congestion, 12	
	Adhesions, 26	
	Removed, 3	
	Thickened, 2	
	Tubercles, 5	
	Tuberculous ulcers, 4	
	Perforation, 1	
	Sacculated, 1	
	Acute inflammation, 2	

As in previous years, the appendix was fixed and prepared for histological examination before being opened. This accounts for the small number of gross lesions recorded. In sixteen cases the appendix was surrounded by adhesions, indicating that at some previous time there had been an inflammatory irritation (probably an acute appendicitis). In two of the cases the appendix was enormously enlarged, deeply congested, surrounded by recent adhesions, and presented the typical appearance of acute suppurative appendicitis. In one other case the appendicitis had progressed to perforation and a small collection of pus was found around the appendix. Acute appendicitis was also noted in several other cases. It is worthy of note that in all of these cases no subjective symptoms or clinical evidence pointed to a pathological lesion of this organ. This is partially explained by the fact that the vitality of the individual is so low just previous to death that the added condition in the right iliac fossa fails to make itself manifest.

The above statement regarding acute appendicitis applies even more forcibly to tuberculosis of the appendix. In the great majority, if not in all, of our cases tuberculosis (either in the form of small submucous tubercles or of distinct tuberculous ulceration) existed without clinical signs. In twenty-eight cases examined histologically, tuberculosis in some form was found in all except in those in which the appendix showed a chronic fibroid condition or in which the lymphatic nodes of the appendix were atrophied. And in not one was a diagnosis made by the clinician.

In the great majority of cases external examination of the

appendix reveals no signs of the tuberculosis. This is especially true when only submucous tubercles are present, because though usually typical and numerous, they are small and are only in the beginning of the yellow stage of the tubercle. In the ulcerative form when the ulcers are large the localized swelling with congestion or the enlargement of the draining lymphatic glands may suggest the underlying condition.

ISCHIORECTAL REGION.

Condition was recorded as	Normal,	57	66 cases
	Abscess,	2	
	Fistula,	7	

SUMMARY FOR FIRST TWO YEARS.

Condition was recorded as	Normal,	61	140 cases
	Scar,	1	
	Abscess,	1	
	Fistula,	5	
	Hemorrhoids,	1	
	Not recorded,	71	

SUMMARY FOR LAST TWO YEARS.

Condition was recorded as	Normal,	111	123 cases
	Abscess,	3	
	Fistula,	9	

The ischiorectal region was inspected in all cases, but histological study of the tissues was made in only a few instances. External and internal hemorrhoids, usually small, were commonly present. Fistulæ were noted in seven cases, and a distinct abscess in two. The gross appearance, however, does not show the small tuberculous lesions frequently present in this part of the intestinal tract. The histological findings of the cases studied showed submucous tubercles far more commonly than one would suspect.

The reasons for localization of the tuberculous process to this part of the bowel are not easily determined. The fact that the lower part of the intestine is a receptacle which holds the infected feces in prolonged contact with the mucous membrane, and the fact that the lower part of the bowel is so frequently the seat of venous stagnation, suggest the possibility that tubercle bacilli may

gain entrance through injury to some of the smaller veins. Against this theory, however, is the other theory that the passive hyperemia so common in this part of the intestine ought to prevent infection, if the ideas regarding heart disease and lung involvement hold true.

Superficial abrasions or fissures are probably of more common occurrence than is generally supposed, and these would readily permit the entrance of infection.

Finally, it must not be forgotten that this part of the lower bowel has some power to absorb. Hence tubercle bacilli may gain entrance to the tissue through the lymphatics, and the smaller tubercles noted above may really have developed in the lymphatic channels of these parts.

Diagnosis of tuberculous lesions of the intestinal tract from the methods at present in vogue is by no means certain. Tubercle bacilli are usually found in the feces of all cases of chronic ulcerative tuberculosis, even when there are no intestinal lesions. They usually come from swallowed sputum, and have no diagnostic value in the determination of tuberculous lesions in the intestine when it is known that an active ulcerating process is taking place within the lungs. Moreover, occult blood in the feces is also of little value, as was pointed out last year, for this blood may be swallowed blood, and, on the other hand, ulceration of the intestines may not be accompanied by hemorrhage.

LIVER.

Color was recorded as	Normal,....	39	66 cases
	Dark,....	13	
	Pale,....	7	
	Mottled,....	7	
Consistency was recorded as.....	Normal,....	2	66 cases
	Firm,....	38	
	Soft,....	26	
Condition was recorded as	Normal,....	3	Out of 66 cases
	Cirrhosis,....	3	
	Fatty,....	26	
	Passive congestion,....	29	
	Amyloid,....	14	
	Tubercles, a few,....	27	
	Perihepatitis, ...	10	

MICROSCOPIC EXAMINATION OF FIFTY CASES.

Congestion slight,	10
Congestion moderate,	20
Congestion marked,	14
General cloudiness slight,	4
General cloudiness marked,	31
Fatty infiltration slight,	16
Fatty infiltration moderate,	1
Fatty infiltration marked,	1
Fatty degeneration,	1
Fatty degeneration slight,	2
Fatty degeneration moderate,	1
Necrosis of cells central part of lobules,	1
Marked hypertrophy of cells,	13
Brown pigmentation,	2
Increase of interstitial tissue slight,	2
Increase of interstitial tissue marked,	9
Hemorrhage,	1
Tubercles,	31
Amyloid slight,	3
Amyloid marked,	7
Capsule thickened,	2
Capsule thickened markedly,	1

SUMMARY FOR FIRST TWO YEARS.

Size was recorded as.....	Normal,	60	140 cases
	Large,	34	
	Small,	14	
	Not recorded,	32	
Color was recorded as....	Normal,	12	140 cases
	Dark,	24	
	Pale,	30	
	Mottled,	7	
	Not recorded,	67	
Consistency was recorded as.....	Normal,	20	140 cases
	Firm,	44	
	Soft,	10	
	Not recorded,	66	
Condition was recorded as	Normal,	42	Out of 140 cases
	Atrophy,	1	
	Red atrophy,	1	
	Cirrhosis,	3	
	Fatty,	23	
	Passive congestion,	13	
	Amyloid,	9	
	Tubercles, few,	14	
	Coalesced tubercles,	1	

SUMMARY FOR LAST TWO YEARS.

Color was recorded as....	Normal,	63	123 cases
	Dark,	27	
	Pale,	15	
	Mottled,	18	
Consistency was recorded as.....	Normal,	7	123 cases
	Firm,	73	
	Soft,	43	

SUMMARY FOR LAST TWO YEARS.—(*Continued.*)

Condition was recorded as	Normal,	6	Out of 123 cases
	Cirrhosis,	4	
	Fatty,	49	
	Passive congestion,	41	
	Amyloid,	26	
	Tubercles, few,	55	
	Tubercles, moderate number,	1	
	Tubercles, numerous,	2	
	Perihepatitis,	12	

The liver shows about the same findings as in previous years. The lesions found are most frequently congestion, with or without fatty change and small scattered tubercles, occasionally amyloid, and rarely various forms of cirrhosis.

Apart from slight enlargement, usually due to congestion, or, if great, to marked amyloid change, little can be determined ante-mortem of the actual condition. Small miliary tubercles are almost always present and were noted in 40.91% of the cases. This number is greatly increased when the liver is studied histologically. Judging from their size, these tubercles are the result of a terminal dissemination. They give rise to no clinical phenomena so far as we know.

Fatty change, which is frequently spoken of in the text-books as more or less common, has not been met so often as they would lead us to expect. Histological examination shows slight fatty change frequently, but only slight. This, of course, gives rise to no clinical signs.

The presence of amyloid has been determined ante-mortem only when the large size of the liver has suggested it. In the very early forms of the infiltration the condition has not been diagnosed.

PANCREAS.

MICROSCOPIC EXAMINATION OF FORTY-EIGHT CASES.

Normal,	4
Congestion slight,	7
Congestion moderate,	2
Cloudy,	6
Fatty infiltration slight,	3
Increase of connective tissue,	16

Increase of connective tissue slight,	10
Increase of connective tissue marked,	2
Cysts,	1
Hemorrhages,	1
Tubercles, yellow,	2
Post-mortem changes,	15
Post-mortem changes marked,	2

We have little or nothing to add to what has been said in previous years in regard to the pancreas.

So far no macroscopic tuberculosis of the pancreas has been observed. Histological examination, however, has shown small tubercles in two cases (4.16%). These tubercles showed the early stages of the yellow tubercle, and were similar in general structure to the terminal tubercles found in other organs. The pancreas, like the other organs, has been sectioned routinely, a section being taken from the head and tail as well as from any suspicious area found. Last year no tubercles were found either macroscopically or microscopically; in other words, we have found tubercles in only two cases out of one hundred and twenty-three.

The reason for the apparent immunity of the pancreas to tuberculosis is difficult to determine. Terminal tubercles are evidently caused by the dissemination of tubercle bacilli by the blood-stream, and it cannot be imagined that they do not reach the pancreas as well as the other organs. After reaching the pancreas, however, they evidently fail to find the soil favorable for growth, either on account of the character of the tissue or the tissue juices. In the two cases in which small microscopic tubercles were found they were located in the connective tissue between the lobules, where the direct action of the pancreatic tissue or its juices did not come in contact with the implanted bacilli.

Sometimes in the region of the head of the pancreas the lymphatic nodes, which are numerous in this situation, show marked caseous tuberculous infiltration. Macroscopically the whole head of the pancreas appears to be involved; careful dissection, however, and study of sections histologically show that

the lymphatic nodes are alone tuberculous and that the adjacent pancreatic tissue is not involved.

OMENTUM.

The amount of fat was recorded as	Normal	40	66 cases
	Excessive	2	
	Diminished	24	
Other conditions were recorded as	Adhesions	3	Out of 66 cases
	Caseous tubercles	2	
	Congested, excessive	3	

SUMMARY FOR LAST TWO YEARS.

Amount of fat was recorded as	Normal	73	123 cases
	Excessive	6	
	Diminished	42	
	Not recorded	2	
Other conditions were recorded as	Adhesions	6	Out of 123 cases
	Caseous tubercles	4	
	Edema	1	
	Congested	3	

No report on first two years.

Practically the same conditions were found in the omentum as in previous years. Our statistics, therefore, only confirm what was described before.

PERITONEUM.

Condition was recorded as	Normal	44	66 cases
	General adhesions	1	
	Local adhesions, old	15	
	Local adhesions, recent	2	
	Congested	4	
Fluid was recorded as	Normal	50	66 cases
	Slight increase	15	
	Fibrinous	1	

SUMMARY FOR FIRST TWO YEARS.

Condition was recorded as	Normal	101	140 cases
	General adhesions	6	
	Local adhesions	18	
	Tuberculous adhesions	2	
	Not recorded	13	
Fluid was recorded as	Increased	24	Out of 140 cases
	Dark	1	
	Cloudy	2	
	Bloody	2	
	Purulent	4	

SUMMARY FOR LAST TWO YEARS.

Condition was recorded as	Normal,	74	123 cases
	General adhesions,	3	
	Local adhesions, old,	40	
	Local adhesions, recent,	2	
	Congested,	4	
Fluid was recorded as	Normal,	83	123 cases
	Slight increase,	21	
	Excessive increase,	18	
	Fibrinous,	1	

Tuberculosis of the peritoneum has been rather an infrequent finding in our cases as compared with the statistics of abdominal surgeons. It is three times more frequent in women than in men. It may arise from blood infection, as in an acute general miliary tuberculosis, from rupture of a tuberculous mesenteric gland or appendix, or—and this is by far the most common—from tuberculosis of the Fallopian tube. In the last case the tuberculosis of the tube is usually secondary to a tuberculous process elsewhere.

According to Murphy, the reason for the frequency of tuberculosis of the peritoneum following tuberculosis of the Fallopian tube, and the infrequency of other inflammations (like a gonococcus inflammation), even when the tube is involved, is that in the former the fimbriæ of the tube remain open, while in the latter they are closed and the lumen sealed.

Tuberculosis of the peritoneum is usually divided into, first, disseminated miliary with ascites; second, plastic or adhesive; third, suppurative or caseous nodular. It is a well-known fact that a large percentage of cases of tuberculous peritonitis heals after a simple laparotomy. This healing has been suggested by some as the result of absorption of the products of dead tubercle bacilli injured during the operation; by others, as the result of the increase in number and in phagocytic qualities of the cells of the peritoneal fluid following the laparotomy; and by still others, as the result of the oxygen in the air at the time of operation, which is supposed to kill the tubercle bacilli.

KIDNEYS.

Shape was recorded as ... (66 cases)

Left.		*Right.*
58,	Normal,	59
5,	Lobulated,	5
1,	Flat,	1
2,	Elongated,	1

Condition was recorded as (Out of 66 cases)

Left.		*Right.*
0,	Interstitial nephritis,	0
38,	Parenchymatous nephritis,	39
24,	Diffuse nephritis,	23
11,	Congested,	13
3,	Amyloid,	3
31,	Miliary tubercles,	38
8,	Movable,	6
5,	Cysts,	4
2,	Infarcts,	0
1,	Tumor (hypernephroma),	0
0,	Scars,	1

MICROSCOPIC EXAMINATION OF FIFTY-SEVEN CASES.

Congestion slight,	6
Congestion moderate,	21
Congestion marked,	19
Congestion Malpighian bodies,	1
Congestion and cysts,	1
Glomeruli large, pale,	3
Glomeruli congested,	3
Glomeruli congested, slight,	1
Glomeruli congested, moderate,	1
Glomeruli congested and hypertrophied,	1
Glomeruli fibroid,	9
Glomeruli fibroid and atrophied,	3
Glomeruli atrophied,	3
Glomeruli amyloid,	1
Glomeruli congested and amyloid,	1
Tubules, general cloudiness,	24
Tubules, general cloudiness slight,	2
Tubules, general cloudiness moderate,	1
Tubules, general cloudiness marked,	1
Tubules generally cloudy and swollen,	14
Tubules generally cloudy, swollen, and necrotic,	2
Tubules markedly cloudy and necrotic,	1
Tubules necrotic,	10
Tubules necrotic and amyloid,	1
Tubules necrotic and contain calcified material,	1
Tubules cloudy and atrophied,	2
Tubules necrotic and atrophied,	2
Tubules atrophied,	6
Tubules dilated and filled with homogeneous or granular material,	13
Hyaline and granular plugs in tubules,	9
Amyloid changes in lumen of tubules,	2
Tubules dilated and cystic,	1
Increase of interstitial tissue slight,	9
Increase of interstitial tissue moderate,	1
Increase of interstitial tissue marked,	2
Increase of interstitial tissue in glomeruli,	1

Increase of interstitial tissue and parenchymatous changes,	1
Increase of interstitial tissue in cortex,	13
Increase of interstitial tissue in cortex and medulla,	5
Increase of interstitial tissue in cortex and medulla with calcification,	1
Increase of interstitial tissue in medulla,	7
Increase of interstitial tissue beneath capsule,	6
Increase of interstitial tissue in medulla and beneath capsule,	1
Interstitial tissue hyaline in places,	1
Capsule thickened,	11
Interstitial nephritis chronic,	8
Interstitial nephritis with marked parenchymatous changes,	3
Scar with atrophy,	1
Tubercles, early,	5
Tubercles, gray and yellow,	2
Cysts,	4
Hypernephroma,	1

SUMMARY FOR LAST TWO YEARS.

	Left.		*Right.*	
Shape was recorded as ...	98,	Normal,	100	123 cases
	18,	Lobulated,	16	
	4,	Flat,	4	
	3,	Elongated,	3	

	Left.		*Right.*	
Condition was recorded as	2,	Interstitial nephritis,	3	Out of 123 cases
	64,	Parenchymatous nephritis,	66	
	1,	Parenchymatous nephritis, acute,	1	
	46,	Diffuse nephritis,	45	
	19,	Congested,	20	
	2,	Pale,	2	
	7,	Amyloid,	7	
	65,	Miliary tubercles,	74	
	10,	Movable,	8	
	8,	Cysts,	7	
	2,	Infarcts,	0	
	1,	Tumor (hypernephroma),	0	
	0,	Ulcerative tuberculosis,	1	
	0,	Scars,	1	

Summary for first two years incomplete.

In the study of the kidneys little can be added to the report of last year. As was to be expected, the same general conditions were found. Moreover, we see no reason to change the simple classification suggested last year, because we believe that such a classification is of far more value than an extensive one. Even with this classification it is difficult enough to classify the conditions found at autopsy. In our table parenchymatous nephritis stands first, with diffuse nephritis as a close second.

Parenchymatous nephritis can usually be expected in cases of pulmonary tuberculosis, and it is similar to the parenchymatous

changes found in other parenchymatous tissues. It probably results from a toxemia produced by the tuberculosis or a mixed infection or both. The marked condition found at autopsy in many cases is in all likelihood partly a terminal degeneration, though the condition in a less severe form may have begun some time previously and gradually progressed. Clinically, the centrifugalized urine of the cases should show at least a slight trace of albumin and a few casts.

Diffuse nephritis as we see it is really the result of a prolonged irritation, and starts very probably from an earlier parenchymatous process, the parenchymatous tissue gradually becoming more degenerated and interstitial changes becoming prominent. In the sixty-six cases not one instance of a typical interstitial nephritis was noted.

As in previous years, we found numerous small tubercles in the kidney. These are probably terminal tubercles similar to those found in other organs. It does not seem possible to diagnose these tubercles with certainty from examination of the urine, because they are usually small, show but little caseation, which is always intact, and are usually well circumscribed by a cellular infiltration which would probably prevent bacilli being thrown off. It is a fact, however, that tubercle bacilli are found in the urine in these cases, but they are probably the result of the kidney excreting tubercle bacilli brought to it by the blood-channels, in precisely the same way as animal experiments have demonstrated that the kidney can throw off various micro-organisms, including tubercle bacilli, which have been injected into the blood-current.

This tuberculosis is not to be confounded with ulcerative tuberculosis of the kidney or phthisis renalis. As in the case of the small tubercles, this process is generally secondary to tuberculosis elsewhere in the body; though the kidney may show larger lesions than any other organ and suggest by the extensiveness that the process is primary in the kidney. In these cases

tubercle bacilli are, of course, thrown off because distinct ulceration is present, which finally leads to breaking down of the kidney structure and formation of a larger or smaller pus or caseous sac.

BLADDER.

Condition was recorded as	Normal,.....	57	Out of 66 cases
	Mucous membrane congested,.....	9	
	Distended,.....	5	
	Thickened walls,.....	2	

SUMMARY FOR FIRST TWO YEARS.

Condition was recorded as	Normal,.....	57	140 cases
	Distended,.....	7	
	Thickened walls,.....	18	
	Inflamed,.....	5	
	Tubercles,.....	1	
	Tuberculous ulcers,.....	2	
	Not recorded,.....	50	

SUMMARY FOR LAST TWO YEARS.

Condition was recorded as	Normal,.....	108	Out of 123 cases
	Mucous membrane congested,.....	14	
	Distended,.....	11	
	Thickened walls,.....	3	
	Inflamed,.....	1	

We have found no gross tuberculosis in the bladder wall. The nine cases tabulated as congested showed a simple congestion without other lesions. The ureters were normal in the sixty-six cases autopsied.

PROSTATE.

Condition was recorded as	Normal,.....	45	50 cases
	Enlarged,.....	5	

SUMMARY FOR LAST TWO YEARS.

Condition was recorded as	Normal,.....	77	88 cases
	Enlarged,.....	11	

No summary for first two years.

The prostate gland was found enlarged in five cases. This enlargement was moderate and occurred only in cases past middle life. Macroscopic sections through the organs failed to show tubercles. Microscopic sections were not studied.

Tuberculosis of the prostate gland is usually secondary to tuberculosis either of the bladder or, more frequently, of the testicles. It is generally of a fibro-caseous type, with a large focus of caseation. Ulceration into the bladder is a usual sequence.

TESTICLES.

	Left.		*Right.*	
Condition was recorded as	47,	Normal,	47	50 cases
	2,	Enlarged,	1	
	1,	Hydrocele,	0	
	0,	Small,	2	

MICROSCOPIC EXAMINATION OF FOURTEEN CASES.

Normal,	2
Increase of fibrous tissue throughout,	8
Increase of fibrous tissue in capsule,	1
Tubules atrophic and walls thickened,	2
Epithelium in tubules replaced by substance like amyloid or hyaline,	5
Brown pigmentation,	1
Tubules show mucoid degeneration and atrophy of mucous membrane,	1

SUMMARY FOR FIRST TWO YEARS.

	Left.		*Right.*	
Condition was recorded as	53,	Normal,	53	55 cases
	2,	Tuberculous,	2	

SUMMARY FOR LAST TWO YEARS.

	Left.		*Right.*	
Condition was recorded as	82,	Normal,	82	88 cases
	1,	Tuberculous,	1	
	3,	Enlarged,	3	
	2,	Hydrocele,	0	
	0,	Small,	2	

The testicles showed about the same condition as in previous years, with the exception that tuberculosis was noted in none of the cases. Histologically, the organs showed a slight increase of fibrous tissue between the tubules, and sometimes a hyaline-like thickening of the walls of the small tubules, localized either to small areas of two or three tubules or to large areas. No miliary tubercles were found in any of the sections examined, even when they were pretty widely distributed through other organs. Macroscopically the testicles were normal, though varying in size.

UTERUS.

Size was recorded as.....	Normal,.....	11	16 cases
	Small,.....	1	
	Large,.....	4	
Condition was recorded as	Normal,.....	11	Out of 16 cases
	Retroversion,.....	5	
	Anteflexion,.....	3	
	Laceration of cervix,.....	2	
	Endometritis,.....	1	
	Adhesion, ...	2	

MICROSCOPIC EXAMINATION OF SEVEN CASES.

Fibroid endometritis,.....	7
Congestion marked,.....	1
Wall normal,.....	1
Congestion of vessels,.....	1
Arteriosclerosis of vessels,.....	2
Amyloid infiltration of vessels (marked),.....	1

SUMMARY FOR LAST TWO YEARS.

Condition was recorded as	Normal,.....	23	Out of 35 cases
	Retroversion,.....	7	
	Anteflexion,.....	3	
	Laceration of cervix,.....	4	
	Endometritis,.....	2	
	Tubercles,.....	1	
	Polyp,.....	1	
	Removed,.....	1	
	Adhesions,.....	2	

No summary for first two years.

FALLOPIAN TUBES.

The Fallopian tubes were recorded as.....	Normal,.....	15	16 cases
	Tuberculosis (caseous),.....	1	

SUMMARY FOR LAST THREE YEARS.

The Fallopian tubes were recorded as.....	Normal,.....	49	63 cases
	Dilated and tortuous,.....	1	
	Removed,.....	1	
	Tuberculosis (caseous),.....	1	
	Ulceration,.....	2	
	Cystic,.....	1	
	Not recorded,.....	8	

No report on first year's cases.

OVARIES.

Left.		*Right.*	
The ovaries were recorded as			16 cases
11,....	Normal,.....	9	
0,....	Cystic,.....	1	
1,....	Enlarged,.....	2	
2,....	Small,.....	2	
2,....	Not recorded,.....	2	

MICROSCOPIC EXAMINATION OF EIGHT CASES.

Fibroid marked,	2
Sclerotic,	4
Graafian follicles small, few,	2
Corpora lutea hyaline,	5
Corpora lutea hyaline, marked,	1
Corpora lutea hemorrhagic,	1
Hemosiderin in old corpora lutea,	1
Cyst,	1
Artery wall thickened,	1
No Graafian follicles,	1

STATISTICS FOR SECOND YEAR.

The ovaries were recorded as

Left.		*Right.*	
7,	Normal,	10	28 cases
13,	Fibroid,	12	
1,	Fibroid and calcified,	0	
4,	Cystic degeneration,	2	
1,	Atrophied,	2	
2,	Not recorded,	2	

SUMMARY FOR LAST TWO YEARS.

The ovaries were recorded as

Left.		*Right.*	
20,	Normal,	19	35 cases
4,	Fibroid,	3	
1,	Fibroid and calcified,	0	
1,	Cystic,	2	
5,	Enlarged,	6	
1,	Congested,	1	
1,	Anemic,	1	
1,	Removed,	1	
2,	Small,	2	

No report on first year's cases.

Tuberculosis was found in the female genital organs but once, and then only in the Fallopian tubes. Tuberculosis of the female genital organs is not so common in cases dying of pulmonary tuberculosis as would be expected from the experience of the abdominal surgeon, who sees especially tuberculosis of the Fallopian tubes rather frequently. It is considered by surgeons as secondary to tuberculosis elsewhere. Even when our cases show widespread tuberculous involvement in the lungs and a general terminal tuberculosis in all the organs, tuberculosis of the genital organs is unusual.

In the one case tabulated the Fallopian tubes were greatly distended, tortuous, and nearly 2 cm. in thickness. Section showed the lumen filled with caseous material and the wall thinned and

overstretched. The fimbriated end of the tube seemed to be open, *i. e.*, the last half, or 1 to 1.5 cm., was not enlarged. No communication, however, was found between the caseous material and the end of the tube, because pressure failed to squeeze out the caseous material.

The uterus in this case was somewhat enlarged, the cavity was reddish in color, but no special evidence of tuberculosis was found either macroscopically or microscopically.

Histological study of the tube showed the central part distinctly caseous, while the outer wall was greatly distended and thinned and showed a fibro-muscular growth lined by a slight round-celled infiltration, though no typical giant cells could be found.

From the standpoint of the surgeon, tuberculous disease of the Fallopian tubes is important because it gives rise to tuberculous peritonitis, which, as was stated above, is three times more common in the female than in the male.

In the study of the ovaries in cases of pulmonary tuberculosis more is found microscopically than macroscopically. These microscopic changes consist for the most part in an increase of fibrous tissue throughout the organ and a decrease in the number of Graafian follicles; in other words, general atrophy of the ovarian structure.

SPLEEN.

Consistency was recorded as.	Soft,	42	66 cases
	Firm,	24	
Color was recorded as.....	Normal,	14	66 cases
	Dark,	43	
	Pale,	9	
Condition was recorded as...	Normal,	12	Out of 66 cases
	Congested,	11	
	Miliary tubercles,	24	
	Amyloid,	19	
	Supernumerary (2),	2	
	Supernumerary (1),	3	
	Acute infection,	5	
	Perisplenitis,	9	
	Infarcts,	1	
	Fissures,	2	

MICROSCOPIC EXAMINATION OF FIFTY-FOUR CASES.

Congestion slight,	15
Congestion moderate,	24
Congestion marked,	13
Congestion marked, hemorrhagic,	1
Malpighian bodies large, borders diffuse,	1
Malpighian bodies few and large,	2
Malpighian bodies few with diffuse borders,	2
Malpighian bodies small,	6
Malpighian bodies small and few,	19
Malpighian bodies numerous and small,	12
Malpighian bodies few, normal size,	3
Trabeculæ prominent,	9
Brown pigmentation,	3
Great thickening of vessels,	3
Capsule normal,	1
Capsule thickened,	9
Old hemorrhage in capsule,	1
Hemorrhage in pulp,	1
Perisplenitis,	1
Tubercles,	24
Tubercles early yellow,	6
Tubercles gray and yellow,	2
Tubercles caseous,	2
Amyloid early,	18
Amyloid early (central artery),	1
Amyloid slight,	2
Amyloid sago spleen,	8

SUMMARY FOR FIRST TWO YEARS.

Size was recorded as	Normal,	50	140 cases
	Enlarged,	45	
	Small,	23	
	Not recorded,	22	
Consistency was recorded as	Normal,	50	140 cases
	Hard,	16	
	Soft,	35	
	Firm,	29	
	Not recorded,	10	
Color was recorded as	Normal,	68	140 cases
	Dark,	30	
	Pale,	5	
	Not recorded,	37	
Condition was recorded as	Normal,	50	Out of 140 cases
	Perisplenitis,	11	
	Congested,	3	
	Pigmented,	1	
	Miliary tubercles,	6	
	Amyloid,	8	
	Scars on the surface,	2	
	Supernumerary (1),	8	
	Supernumerary (2),	3	
	Supernumerary (3),	1	
	Infarct,	1	
	Not recorded,	58	

SUMMARY FOR THE LAST TWO YEARS.

Consistency was recorded as.	Soft,	79	123 cases
	Firm,	44	
Color was recorded as.....	Normal,	23	123 cases
	Dark,	83	
	Pale,	17	
Condition was recorded as...	Normal,	20	Out of 123 cases
	Congested,	30	
	Miliary tubercles,	42	
	Amyloid,	33	
	Supernumerary,	8	
	Acute infection,	5	
	Perisplenitis,	9	
	Infarcts,	1	
	Fissures,	2	

During the current year two supernumerary spleens were found in two cases and one in three cases. All of these were small, about the size of a cherry-stone, except one which was the size of a large cherry.

In cases of chronic pulmonary tuberculosis the spleen is generally slightly enlarged, dark in color, and soft in consistence; in other words, it is moderately congested. This congestion is explained partly by a mild grade of passive hyperemia, due to failing circulation, and partly by an active hyperemia due to the mixed infection which usually exists in the lung itself or in its cavities, etc.

In addition, this spleen may be soft for another reason, namely, as the result of post-mortem changes or autolysis, which sometimes take place very rapidly. In this case the color is a pale brick red, the consistence almost diffluent, and the normal landmarks are obscured.

Miliary tubercles, for the most part terminal, were noted in twenty-four cases. It is difficult to tell in the fresh state an early gray tubercle from an enlarged Malpighian body. As a rule, however, the tubercles are slightly more opaque or are slightly yellowish in color, while the Malpighian bodies have a greenish or a whitish hue. Another aid in the differentiation is the irregular distribution and size of the tubercles.

Amyloid was found macroscopically in nineteen cases, or in seven cases more than it was found in the liver. It was found in even a larger number microscopically.

With the exception of the markedly amyloid cases the spleen was at no time sufficiently enlarged to be palpated ante-mortem, though occasionally it might have shown slight enlargement to percussion. The larger amyloid spleens could be readily palpated and showed marked enlargement to percussion.

LYMPHATIC GLANDS.

Mesenteric,..	Size was recorded as.....	Normal,..... 11 Enlarged,..... 55	66 cases	
	Condition was recorded as.....	Distinctly caseous,..... 21	Out of 66 cases	

MICROSCOPIC EXAMINATION OF THE MESENTERIC GLANDS OF FORTY-FIVE CASES.

Congestion slight,.....	6
Congestion moderate,.....	7
Congestion marked,.....	6
Anthracosis,.....	3
Brown pigmentation, ...	1
Edema,.....	1
Increase of endothelial cells in sinuses,.....	1
Increase of fibrous tissue,.....	4
Fibroid changes with mucoid degeneration,.....	1
Fibroid changes with lymph follicles numerous and large,.....	1
Obliteration of artery with calcification,.....	2
Capsule thickened,.....	1
Tuberculosis,.....	16
Tuberculosis early yellow,.....	2
Tuberculosis caseous,.....	3
Tuberculosis chronic fibroid,.....	1
Tuberculosis marked,.....	16
Amyloid,.....	11
Amyloid slight,.....	1
Amyloid moderate,.....	1
Amyloid marked,.....	4

Cervical, ...	Size was recorded as.....	Normal,..... 33 Enlarged,..... 33		
Inguinal, ...	Size was recorded as.....	Normal,..... 21 Enlarged,..... 3 Palpable,..... 42	66 cases	
Bronchial,...	Size was recorded as.....	Normal,..... 2 Enlarged,..... 64		
	Condition was recorded as.....	Anthracotic,..... 43	Out of 66 cases	

SUMMARY FOR LAST TWO YEARS.

Mesenteric,..	Size was recorded as.....	Normal,..... 20 Enlarged,.....103	123 cases	
	Condition was recorded as.....	Distinctly caseous,..... 46	Out of 123 cases	
Cervical, ...	Size was recorded as.....	Normal,..... 70 Enlarged,..... 53	123 cases	
Inguinal,..... ..	Size was recorded as.....	Normal,..... 34 Enlarged,..... 6 Palpable,..... 83		
Bronchial,...	Size was recorded as.....	Normal,..... 5 Enlarged,.....118		
	Condition was recorded as.....	Anthracotic,..... 92	Out of 123 cases	

No summary for first two years.

The cervical, bronchial, axillary, and inguinal glands were studied only macroscopically; the mesenteric were studied also microscopically. Enlargement of external lymphatic glands, especially the inguinal, is as common in tuberculosis as it is in other conditions, and arises from various causes. The cervical glands are almost always enlarged, due usually to conditions in the upper respiratory tract and mouth. In cases showing severe ulcerative conditions in the larynx or disease of the tonsils they are usually greatly enlarged and very frequently caseous. The deeper groups of cervical glands are more commonly enlarged than the superficial.

The mesenteric glands are usually enlarged, especially those in the ileocecal region. Moreover, microscopic examination usually shows tuberculosis. The tuberculous lesions vary from the young gray or grayish-yellow tubercles to large masses of caseous infiltration, which may or may not show calcification. Frequently these caseous glands show an excess of fibroid tissue, which points to a much slower process than ordinarily.

Tuberculosis of the mesenteric glands probably results in great part from infection through swallowed sputum; at least there is more evidence in favor of this view than that these lesions were primary. It is also probable that groups of these glands are infected from the other glands in the immediate vicinity through a

reversal of the direction of the lymph flow. The fact that the intestinal mucous membrane allows the passage of tubercle bacilli without producing lesions explains, in part at least, the frequent infection of these glands, because in a case of chronic ulcerative pulmonary tuberculosis it is practically impossible for the patient not to swallow a certain amount of bacilli-laden sputum.

TONSILS.

	Left.		*Right.*	
Size was recorded as.....	37,	Normal,	37	66 cases
	25,	Enlarged,	25	
	4,	Atrophied,	4	
	Left.		*Right.*	
Condition was recorded as*	65,	Normal,	66	66 cases
	1,	Ulcerated,	0	

* The size and general condition were determined at the time of autopsy. The majority of specimens were also studied histologically.

MICROSCOPIC EXAMINATION OF FORTY-SIX CASES.

Congestion slight,	3
Congestion moderate,	1
Congestion marked,	4
Increase of fibrous tissue,	29
Increase of fibrous tissue marked,	1
Atrophy,	6
Hypertrophied lymphoid,	4
Tuberculosis,	28
Tuberculosis yellow stage,	3
Tuberculosis marked,	11
Amyloid,	7
No tubercles observed on one section of each tonsil,	4

SUMMARY FOR LAST TWO YEARS.

	Left.		*Right.*	
Size was recorded as.....	66,	Normal,	67	123 cases
	40,	Enlarged,	39	
	6,	Atrophied,	6	
	11,	Not recorded,	11	
	Left.		*Right.*	
Condition was recorded as..	94,	Normal	95	123 cases
	2,	Ulcerated,	1	
	5,	Tubercles,	5	
	22,	Not removed,	22	

No summary for first two years.

From the above tables it is evident that the condition of the tonsils macroscopically is rather misleading. The tonsils were recorded macroscopically normal as to condition in 98.5% of the

cases and normal as to size in 56%, yet microscopically they showed tuberculosis in 91% and a fibroid condition in 65%. The tuberculosis in these cases varies in extent from small miliary tubercles, which are common, to large caseous areas within the lymphoid tissue. The lesions, in the early stages at least, show no tendency to run together to form large caseous masses, but remain as isolated foci in the early yellow stage of the tubercle.

Considering the tonsils as lymphoid organs, the form of tuberculosis we find in them would correspond to early lesions in lymphatic glands; from this it would seem that the foci of tuberculosis in the tonsils are of recent rather than old origin. This does not, of course, deny that the tonsils may have been the portals of entry for the pulmonary tuberculosis, because tubercle bacilli may pass through into the draining lymphatics without lesions of the tonsils themselves.

SUPRARENALS.

	Left.		*Right.*	
Size was recorded as.....	65,	Normal,	63	66 cases
	0,	Increased,	2	
	1,	Small,	1	
	Left.		*Right.*	
Shape was recorded as.....	59,	Normal,	59	66 cases
	6,	Elongated,	5	
	0,	Thinner than normal,	1	
	1,	Not recorded,	1	
	Left.		*Right.*	
Condition was recorded as...	62,	Normal,	63	66 cases
	3,	Caseous,	3	
	1,	Cyst,	0	

MICROSCOPIC EXAMINATION OF FORTY-EIGHT CASES.

Cloudiness,	4
Congestion cortex, slight,	8
Congestion cortex, moderate,	3
Congestion cortex, marked,	7
Congestion medulla, slight,	10
Congestion medulla, marked,	1
Congestion inner zone,	1
Fatty changes,	14
Irregular necrotic areas,	1
Increase of interstitial tissue,	27
Increase of interstitial tissue outer zone and capsule,	2
Increase of interstitial tissue outer and middle zones,	2
Fibrous nodule,	1

MICROSCOPIC EXAMINATION OF FORTY-EIGHT CASES.—(*Continued.*)

Hemorrhage,	1
Hemorrhage into medulla,	1
Tubercles, outer layer,	2
Tubercles, caseous,	6
Tubercles, early caseous,	2
Amyloid,	4
Amyloid and atrophied,	1
Thickening of capsule slight,	12
Thickening of capsule marked,	1

SUMMARY FOR FIRST TWO YEARS.

	Left.		*Right.*	
Size was recorded as	54,	Normal,	54	140 cases
	10,	Increased,	9	
	2,	Decreased,	2	
	74,	Not recorded,	75	
	Left.		*Right.*	
Condition was recorded as	58,	Normal,	55	140 cases
	9,	Fibroid,	8	
	3,	Tubercles,	3	
		Tubercles (side not specified),	5	
	70,	Not recorded,	74	

SUMMARY FOR LAST TWO YEARS.

	Left.		*Right.*	
Size was recorded as	109,	Normal,	107	123 cases
	6,	Increased,	7	
	1,	Decreased,	2	
	7,	Not recorded,	7	
	Left.		*Right.*	
Shape was recorded as	108,	Normal,	111	123 cases
	12,	Elongated,	8	
	0,	Thinner than normal,	1	
	1,	Small,	1	
	2,	Not recorded,	2	
	Left.		*Right.*	
Condition was recorded as	70,	Normal,	73	123 cases
	3,	Tubercles,	0	
	5,	Caseous,	4	
	1,	Cyst,	0	
	0,	Anemic,	2	
	44,	Not recorded,	44	

Nothing of importance can be gathered from the study of the suprarenals in the sixty-six cases of the year, other than to confirm what was stated last year.

THYROID GLAND.

Condition was recorded as	Normal,	46	66 cases
	Generally enlarged,	18	
	Not recorded,	2	

MICROSCOPIC EXAMINATION OF FORTY-TWO CASES.

Increase of interstitial tissue slight,	28
Increase of interstitial tissue moderate,	2
Increase of interstitial tissue marked,	8
Atrophy of glandular tissue,	4
Tuberculosis,	2
Calcification of large vessel,	4
Fibroid,	3
Normal,	3

SUMMARY FOR LAST TWO YEARS.

Condition was recorded as...	Normal,	94	123 cases
	Generally enlarged,	23	
	Not recorded,	6	

No summary for first two years.

The thyroid gland in cases of tuberculosis appears usually a trifle enlarged. This enlargement, however, may not be due to an actual increase in the size of the organ, but to the emaciation of the surrounding tissues, so that the gland stands out more prominently and seems enlarged.

Macroscopically it presents very little change from the normal, with the exception that it is paler in color. Microscopically there is generally an increase of fibrous tissue, which is sometimes extreme. The only other abnormality worthy of notice is a thickening of the arteries, and very frequently distinct calcification.

The thymus gland was atrophied in all the sixty-six cases.

BEDSORES.

Number of cases with bedsores, ... 6, out of 66 cases

SUMMARY FOR FOUR YEARS.

Number of cases with bedsores, ... 26, out of 263 cases

C. Y. WHITE.

BACTERIOLOGICAL REPORT OF THE YEAR.

In the past year sixty-nine* cases were autopsied, and of these sixty-seven were studied bacteriologically. The average time which elapsed between death and the autopsy was twenty-four hours. Cultures from the various organs were obtained by searing the surface of the organ with a red-hot iron, and passing a large, flat, spear-pointed needle, with an eye drilled through it (Nuttall's spear), into the tissues through the seared area. The cultures were made for the most part on slanted 5% glycerin-agar, and were examined after forty-eight to seventy-two hours of incubation. Isolation of cultures was subsequently made on such media as seemed best for the case under examination.

The following are the micro-organisms found in the various cases somewhere or other in the body. In a general way the findings agree with those of last year, the kidney again being found more frequently infected than the liver.

Just as in the tables of last year, the streptococcus was the organism most frequently found. Out of the sixty-seven cases, the streptococcus was found fifty-six times; the bacillus coli communis, forty-nine; the staphylococcus pyogenes aureus, thirty-nine; the staphylococcus pyogenes albus, thirty-four; the pneumococcus, thirty-two; the bacillus diphtheriæ (pseudo?), sixteen; and the bacillus pyocyaneus, eight.

In the summary for two years, out of one hundred and twenty-three cases, the streptococcus was found ninety-five times; the bacillus coli communis, eighty-nine; the staphylococcus pyogenes aureus, sixty-five; the staphylococcus pyogenes albus, sixty-four; the pneumococcus, forty-one; the bacillus diphtheriæ (pseudo?), twenty-seven; and the bacillus pyocyaneus, thirteen times.

* The "Pathological Report of the Year" is on sixty-six cases, the report of one not having been written and the reports of two others having been inadvertently omitted. These last two will be reported with the autopsies of next year.

CASES EXAMINED AND MICRO-ORGANISMS FOUND.

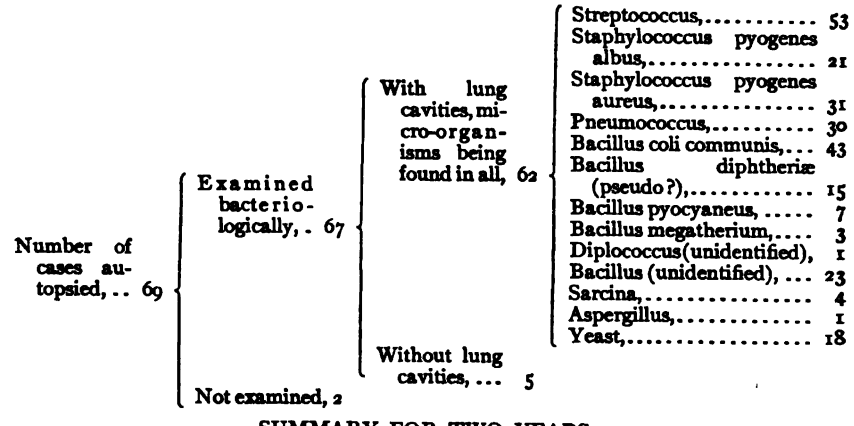
	Streptococcus.	Staphylococcus pyogenes albus.	Staphylococcus pyogenes aureus.	Pneumococcus.	Bacillus coli communis.	Bacillus diphtheriæ (pseudo?).	Bacillus pyocyaneus.	Bacillus mesentericus.	Small Diplococcus (Unidentified).	Large White Coccus (Unidentified).	Bacillus (Unidentified).	Cladothrix dichotoma.	Sarcina.	Aspergillus.	Yeast.
903	+	o	+	+	o	+	o	o	o	o	o	o	+	o	o
1975	o	o	o	+	o	o	o	o	o	o	o	o	+	o	o
2019	o	o	o	o	+	o	+	o	+	o	o	o	o	o	o
2727	o	o	o	+	o	o	o	o	o	o	o	o	o	o	o
2861	+	o	+	o	+	o	o	o	o	o	+	o	o	o	o
2980	+	o	+	o	+	o	o	o	o	o	o	+	o	o	o
3052	+	o	+	o	+	o	o	o	o	o	o	o	o	o	o
3119	o	+	o	+	+	o	o	o	o	o	+	o	o	o	o
3393	+	o	+	+	+	+	o	o	o	o	+	o	o	o	+
3441	+	o	+	+	+	+	o	o	o	o	+	o	o	o	+
3548	+	o	+	+	+	+	o	o	o	o	+	o	o	o	+
3638	+	o	o	+	+	+	o	o	o	o	o	o	o	o	o
3643	+	+	+	o	+	o	o	o	o	o	+	o	o	o	+
3677	+	o	o	+	+	o	o	o	o	o	+	o	o	o	+
3731	+	+	+	+	+	o	o	o	o	o	o	o	o	o	o
3792	o	+	o	o	o	o	o	o	o	o	o	o	o	o	o
3831	o	+	o	o	o	o	o	o	o	o	o	o	o	o	o
3880	+	+	+	o	o	o	+	o	o	o	+	o	o	o	o
3887	+	o	+	+	+	o	o	o	o	o	o	o	o	o	o
3896	+	+	o	+	+	o	+	o	o	o	o	o	o	o	+
3907	+	o	o	o	+	o	o	o	o	o	+	o	o	o	+

CASES EXAMINED AND MICRO-ORGANISMS FOUND.—(*Continued.*)

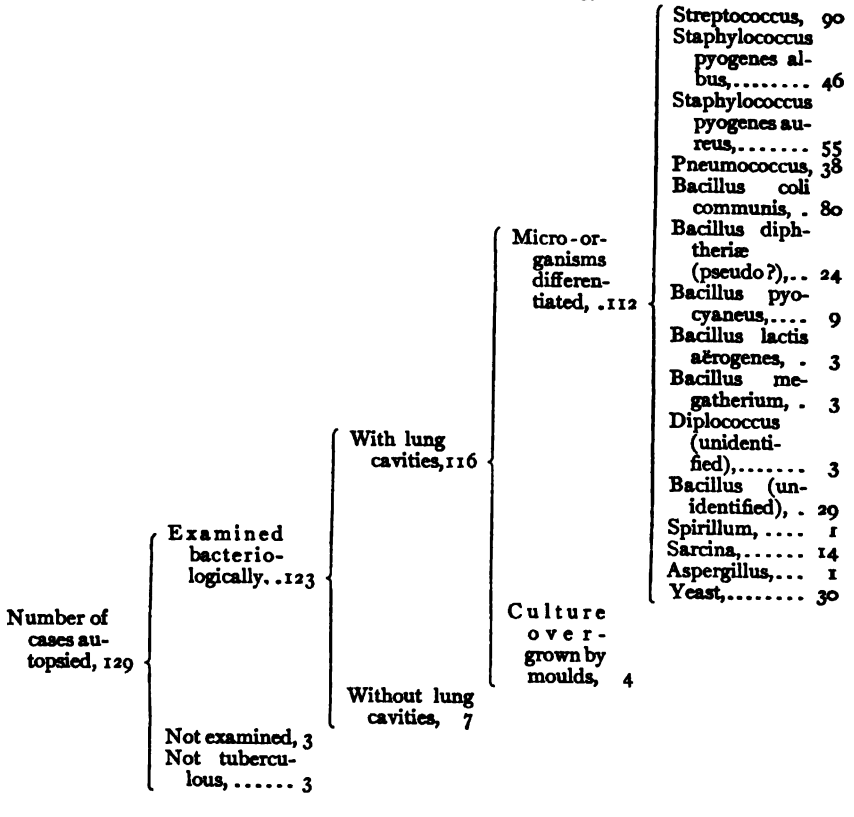
	STREPTOCOCCUS.	STAPHYLOCOCCUS PYOGENES ALBUS.	STAPHYLOCOCCUS PYOGENES AUREUS.	PNEUMOCOCCUS.	BACILLUS COLI COMMUNIS.	BACILLUS DIPHTHERIÆ (PSEUDO?).	BACILLUS PYOCYANEUS.	BACILLUS MESENTERICUS.	SMALL DIPLOCOCCUS (UNIDENTIFIED).	LARGE WHITE COCCUS (UNIDENTIFIED).	BACILLUS (UNIDENTIFIED).	CLADOTHRIX DICHOTOMA.	SARCINA.	ASPERGILLUS.	YEAST.
3918.....	o	+	o	o	o	o	o	o	o	o	+	o	o	o	+
3941.....	+	+	+	+	+	o	o	o	o	o	+	o	o	o	o
3949.....	+	o	+	+	+	+	o	o	o	o	+	o	o	o	o
3953.....	+	o	+	+	o	o	o	o	o	o	o	o	o	+	+
3961.....	+	+	+	+	o	o	o	o	o	o	o	o	o	o	o
4010.....	+	+	+	o	o	+	o	o	o	+	+	o	o	o	+
4021.....	+	o	+	o	+	o	o	o	o	o	+	o	o	o	+
4023.....	+	o	+	o	+	o	o	o	o	o	+	o	o	o	o
4040.....	o	+	+	o	+	o	o	o	o	o	+	o	o	o	+
4097.....	+	+	+	+	o	o	o	o	o	o	+	o	o	o	o
4116.....	+	+	o	o	+	o	o	o	+	o	+	o	o	o	+
4122.....	+	o	+	+	+	+	o	o	o	o	o	o	o	o	o
4140.....	+	o	+	o	+	o	o	o	o	o	o	o	o	o	o
4141.....	+	+	o	o	+	o	o	o	o	o	+	o	o	o	+
4148.....	+	+	+	o	+	+	o	o	o	o	o	o	o	+	o
4155.....	+	o	+	+	+	o	o	o	o	o	+	o	o	o	o
4164.....	+	o	o	o	+	o	o	o	o	o	+	o	o	o	o
4168.....	o	+	+	+	o	o	o	o	o	o	+	+	o	o	o
4180.....	+	o	o	o	o	o	+	o	o	o	+	+	o	o	o
4197.....	+	+	+	+	+	o	o	o	o	o	+	o	o	o	o
4202.....	+	+	o	o	+	+	o	o	o	o	+	o	o	o	+

4221.....	+	+	o	+	+	o	+	o	o	o	o	o	o	o	o	o	o	+
4224.....	+	+	o	+	+	o	o	+	o	o	o	o	+	o	o	o	o	o
4232.....	+	+	o	o	+	+	+	+	o	o	o	o	o	o	o	o	o	+
4243.....	+	o	+	o	o	+	o	+	+	o	o	o	+	o	o	o	o	o
4246.....	+	+	o	+	+	o	+	o	o	o	o	o	+	o	o	o	o	+
4248.....	+	+	o	+	+	o	+	o	o	o	o	o	+	o	o	o	o	o
4272.....	+	o	+	+	+	+	+	o	o	o	o	o	o	o	o	o	o	o
4281.....	+	o	o	+	o	+	+	o	+	o	o	o	o	o	o	o	o	+
4282.....	+	+	o	o	o	+	+	o	o	o	o	o	+	o	o	o	o	o
4287.....	+	o	o	o	o	+	+	o	o	o	o	o	+	o	o	o	o	o
4306.....	+	o	o	o	o	+	+	o	o	o	o	o	o	o	o	o	o	+
4316.....	+	o	o	o	+	+	+	o	o	o	o	o	o	o	o	o	o	o
4345.....	+	o	+	o	+	+	o	+	o	o	o	+	+	o	o	o	o	+
4364.....	o	+	+	+	+	+	o	+	o	o	o	o	o	o	o	o	o	o
4371.....	+	+	+	o	+	+	+	o	+	o	o	o	o	o	o	o	o	+
4380.....	+	o	+	o	+	+	+	o	o	o	o	o	o	o	o	o	o	o
4415.....	+	+	+	o	+	+	+	o	o	o	o	o	+	o	o	o	o	o
4460.....	+	o	+	o	+	+	+	+	o	o	o	+	+	o	o	o	o	o
4462.....	+	+	+	o	o	+	+	o	o	o	o	o	o	o	o	o	o	o
4500.....	o	+	+	o	o	+	+	o	o	o	o	o	+	o	o	o	o	o
4522.....	+	+	+	+	+	+	o	+	o	o	o	o	o	o	o	o	o	o
4587.....	+	+	+	o	o	+	+	o	o	o	o	o	o	o	o	o	o	+
4659.....	+	+	+	+	o	+	+	o	o	o	o	o	o	o	o	o	o	+
4719.....	o	o	o	o	o	+	+	o	o	o	o	o	o	o	o	o	o	o
4735.....	+	+	+	+	o	+	o	+	o	o	o	o	o	o	o	+	o	o
Total.....	56	34	39	32	49	16	8	3	3	2	34	2	2	1	4	2	1	18

MICRO-ORGANISMS IN LUNG CAVITIES.


Number of cases autopsied, .. 69
Examined bacteriologically, . 67
Not examined, 2
With lung cavities, micro-organisms being found in all, 62
Without lung cavities, ... 5
Streptococcus, ... 53
Staphylococcus pyogenes albus, ... 21
Staphylococcus pyogenes aureus, ... 31
Pneumococcus, ... 30
Bacillus coli communis, ... 43
Bacillus diphtheriæ (pseudo?), ... 15
Bacillus pyocyaneus, ... 7
Bacillus megatherium, ... 3
Diplococcus (unidentified), 1
Bacillus (unidentified), ... 23
Sarcina, ... 4
Aspergillus, ... 1
Yeast, ... 18

SUMMARY FOR TWO YEARS.



As can be seen from the above tables, the streptococcus was by far the most frequently found organism. The following is the percentage times the different organisms were found during the current year: streptococcus, 85.48%; bacillus coli communis, 69.35%; staphylococcus pyogenes aureus, 50.00%; pneumococcus, 48.39%; staphylococcus pyogenes albus, 33.87%; bacillus diphtheriæ (pseudo?), 24.19%; and the bacillus pyocyaneus, 11.29%. The following is the percentage for two years: streptococcus, 80.36%; bacillus coli communis, 71.43%; staphylococcus pyogenes aureus, 49.11%; staphylococcus pyogenes albus, 41.07%; pneumococcus, 33.93%; bacillus diphtheriæ (pseudo?), 21.43%; and the bacillus pyocyaneus, 8.04%.

Though the finding of pus-producing micro-organisms in cavities does not positively indicate that mixed infection existed, there is no good reason for doubting that in the very great majority of cases mixed infection did exist on account of the fact that the individual died. It is astonishing to one doing autopsies on tuberculous cases how advanced a case of pure tuberculosis may become before death occurs, and even then the case appears to require something more than the tuberculous process, like, for instance, a mixed infection, in order to actually produce death.

Clinically the presence of pus-producing micro-organisms in sputum is not sufficient for the diagnosis of mixed infection, because the contaminating organisms may have come from the mouth. Some investigators believe, however, that if the micro-organisms can be proved to have come from the lungs, they do constitute evidence of mixed infection, and in all of these cases they come, of course, from the lungs.

AREAS OF BRONCHO-CASEOUS PNEUMONIA.

Areas of broncho-caseous pneumonia occurred in practically every case dying of advanced tuberculosis of the lungs, but of these only twenty-one were examined during the current year and twenty-six during the two years. In the twenty-one cases

examined during the current year no micro-organisms were found in 19.05%. In the cases in which micro-organisms were found the streptococcus occurred in 76.47%; the staphylococcus pyogenes aureus in 47.06%; the bacillus coli communis in 35.29%; the staphylococcus pyogenes albus in 29.41%; the pneumococcus in 29.41%; the bacillus diphtheriæ (pseudo?) in 11.76%; and the bacillus pyocyaneus in 5.88%. In the twenty-six cases examined during the two years no micro-organisms were found in 23.08%. In the cases in which micro-organisms were found the streptococcus occurred in 70%; the staphylococcus pyogenes aureus in 50%; the bacillus coli communis in 35%; the staphylococcus pyogenes albus in 30%; the pneumococcus in 30%; the bacillus diphtheriæ (pseudo?) in 15%; and the bacillus pyocyaneus in 5%.

Number of cases examined, .. 21

- In which micro-organisms were found, ... 17
  - Streptococcus,..... 13
  - Staphylococcus pyogenes albus, ... 5
  - Staphylococcus pyogenes aureus,..... 8
  - Pneumococcus,..... 5
  - Bacillus coli communis,..... 6
  - Bacillus diphtheriæ (pseudo?),..... 2
  - Bacillus pyocyaneus,..... 1
  - Bacillus (unidentified),..... 4
  - Yeast,..... 1
- In which no micro-organisms were found,..... 4

SUMMARY FOR TWO YEARS.

Number of cases examined, .. 26

- In which micro-organisms were found, ... 20
  - Streptococcus,..... 14
  - Staphylococcus pyogenes albus, ... 6
  - Staphylococcus pyogenes aureus,..... 10
  - Pneumococcus,..... 6
  - Bacillus coli communis,..... 7
  - Bacillus diphtheriæ (pseudo?), ... 3
  - Bacillus pyocyaneus,..... 1
  - Diplococcus (unidentified),..... 1
  - Bacillus (unidentified),..... 4
  - Yeast,..... 1
- In which no micro-organisms were found,..... 6

From the standpoint of mixed infection it is scarcely possible to conceive that these pus-producing micro-organisms could occur

so frequently in cavities and in apparently closed tuberculous areas without a definite condition of mixed infection being present.

KIDNEYS.

Number of kidneys examined, ... 67

- In which micro-organisms were found, ... 33
  - Streptococcus, ... 12
  - Staphylococcus pyogenes albus, ... 12
  - Staphylococcus pyogenes aureus, ... 4
  - Bacillus coli communis, ... 19
  - Bacillus diphtheriæ (pseudo?), ... 1
  - Bacillus pyocyaneus, ... 1
  - Bacillus (unidentified), ... 8
  - Yeast, ... 1
- In which no micro-organisms were found, ... 34

SUMMARY FOR TWO YEARS.

Number of kidneys examined, ... 123

- In which micro-organisms were found, ... 62
  - Streptococcus, ... 22
  - Staphylococcus pyogenes albus, ... 17
  - Staphylococcus pyogenes aureus, ... 6
  - Pneumococcus, ... 2
  - Bacillus coli communis, ... 38
  - Bacillus diphtheriæ (pseudo?), ... 4
  - Bacillus pyocyaneus, ... 2
  - Bacillus lactis aërogenes, ... 1
  - Bacillus megatherium, ... 1
  - Diplococcus (unidentified), ... 2
  - Bacillus (unidentified), ... 11
  - Spirillum, ... 1
  - Sarcina, ... 1
  - Bacillus typhosus, ... 1
  - Yeast, ... 1
- In which no micro-organisms were found, ... 61

Like last year, the kidneys lead the liver in the number of micro-organisms found, the bacillus coli communis being the most frequently found. Out of the sixty-seven cases examined during the current year no micro-organisms were found in 50.75%. In the cases in which micro-organisms were found the bacillus coli communis occurred in 57.58%; the streptococcus in 36.36%; the staphylococcus pyogenes albus in 36.36%; the staphylococcus pyogenes aureus in 12.12%; bacillus diphtheriæ (pseudo?) in 3.03%; bacillus pyocyaneus in 3.03%. In the one hundred and twenty-three cases examined for the two years no micro-organisms were found in 49.59%. In the cases in which micro-organisms

were found the bacillus coli communis occurred in 61.29%; the streptococcus in 35.48%; the staphylococcus pyogenes albus in 27.42%; staphylococcus pyogenes aureus in 9.68%; the bacillus diphtheriæ (pseudo?) in 6.45%; the pneumococcus in 3.23%; and the bacillus pyocyaneus in 3.23%.

LIVER.

Number of livers examined,..... 67

- In which micro-organisms were found, ... 26
  - Streptococcus,..... 8
  - Staphylococcus pyogenes albus, ... 6
  - Staphylococcus pyogenes aureus,..... 3
  - Bacillus coli communis,..... 14
  - Bacillus diphtheriæ (pseudo?),..... 1
  - Bacillus pyocyaneus,..... 1
  - Bacillus (unidentified),..... 7
  - Cladothrix dichotoma,..... 1
- In which no micro-organisms were found,..... 41

SUMMARY FOR TWO YEARS.

Number of livers examined,.....123

- In which micro-organisms were found, ... 46
  - Streptococcus,..... 10
  - Staphylococcus pyogenes albus,..... 7
  - Staphylococcus pyogenes aureus,..... 4
  - Pneumococcus,..... 1
  - Bacillus coli communis,..... 26
  - Bacillus diphtheriæ (pseudo?),..... 1
  - Bacillus pyocyaneus,..... 3
  - Bacillus lactis aërogenes,..... 2
  - Diplococcus (unidentified),..... 1
  - Bacillus (unidentified),..... 11
  - Cladothrix dichotoma,..... 3
- In which no micro-organisms were found,..... 77

Out of the sixty-seven cases examined during the current year no micro-organisms were found in 61.19%. In the cases in which micro-organisms were found the bacillus coli communis occurred in 53.85%; the streptococcus in 30.77%; the staphylococcus pyogenes albus in 23.08%; the staphylococcus pyogenes aureus in 11.54%; the bacillus diphtheriæ (pseudo?) in 3.85%; and the bacillus pyocyaneus in 3.85%. In the one hundred and twenty-three cases examined during the two years no micro-organisms were found in 62.60%. In the cases in which micro-organisms were found the bacillus coli communis occurred in 56.52%; the

streptococcus in 21.74%; the staphylococcus pyogenes albus in 15.22%; the staphylococcus pyogenes aureus in 8.70%; the bacillus pyocyaneus in 6.52%; the bacillus diphtheriæ (pseudo?) in 2.17%; and the pneumococcus in 2.17%.

It is to be remarked that though the bacillus coli communis occurred more commonly in the liver than any other organism, it occurred more frequently in the kidney than in the liver, namely, nineteen to fourteen times during the current year and thirty-eight to twenty-six times during the two years.

SPLEEN.

Number of spleens examined, ... 67

- In which micro-organisms were found, ... 15
  - Streptococcus, ... 2
  - Staphylococcus pyogenes albus, ... 4
  - Staphylococcus pyogenes aureus, ... 1
  - Bacillus coli communis, ... 7
  - Diplococcus (unidentified), ... 1
  - Bacillus (unidentified), ... 5
- In which no micro-organisms were found, ... 52

SUMMARY FOR TWO YEARS.

Number of spleens examined, ...123

- In which micro-organisms were found, ... 28
  - Streptococcus, ... 8
  - Staphylococcus pyogenes albus, ... 5
  - Staphylococcus pyogenes aureus, ... 2
  - Bacillus coli communis, ... 14
  - Bacillus diphtheriæ (pseudo?), ... 1
  - Diplococcus (unidentified), ... 1
  - Bacillus (unidentified), ... 8
  - Cladothrix dichotoma, ... 1
  - Sarcina, ... 1
- In which no micro-organisms were found, ... 95

Considering the spleen as a blood organ, it is rather remarkable the small number of times it was found infected. Out of sixty-seven cases examined during the current year, no micro-organisms were found in 77.61%. In the cases in which micro-organisms were found the bacillus coli communis occurred in 46.67%; the staphylococcus pyogenes albus in 26.67%; the streptococcus in 13.33%; and the staphylococcus pyogenes aureus in 6.67%. In the one hundred and twenty-three cases examined during the two years no micro-organisms were found in 77.24%. In the

cases in which micro-organisms were found the bacillus coli communis occurred in 50%; the streptococcus in 28.57%; the staphylococcus pyogenes albus in 17.86%; the staphylococcus pyogenes aureus in 7.14%; and the bacillus diphtheriæ (pseudo?) in 3.57%.

The total number of cases examined is still too small to draw accurate deductions therefrom. The frequency, however, with which the streptococcus is found in all organs makes it appear at least that the streptococcus is frequently the agent in causing the eventual death of the individual. This is readily credible, since, as has been said before, no matter how advanced a pure tuberculosis becomes, it rarely kills without an added infection of some kind.

PYOPNEUMOTHORAX.

SUMMARY FOR TWO YEARS.

Case 2780,..... { Streptococcus; Staphylococcus pyogenes aureus; Bacillus coli communis

Case 2828,..... { Pneumococcus; Bacillus coli communis

Case 3441,..... { Streptococcus; Pneumococcus; Bacillus diphtheriæ (pseudo?); Bacillus (unidentified)

Case 3749,..... Bacillus (unidentified)

Case 4522,..... Staphylococcus pyogenes aureus

SPECIAL EXAMINATIONS OF SPECIAL CASES.

Blood from cavity,..... { Case 3548,..... { Streptococcus; Pneumococcus; Bacillus diphtheriæ (pseudo?); Bacillus (unidentified)

Case 3961,..... { Staphylococcus pyogenes albus; Pneumococcus

Edema, lungs,..... { (plate), Case 4168,..... { Staphylococcus pyogenes albus; Staphylococcus pyogenes aureus; Cladothrix dichotoma; Bacillus (unidentified)

(slant), Case 4168,..... Negative

Pleura,..... Case 4122,..... { Streptococcus; Staphylococcus pyogenes aureus; Bacillus coli communis

Empyema,	Case 3887,	Streptococcus Staphylococcus pyogenes aureus
	Case 4116,	Streptococcus Staphylococcus pyogenes albus Bacillus coli communis Bacillus (unidentified)
Peritonitis,	Case 4140,	Streptococcus Staphylococcus pyogenes aureus Bacillus coli communis
	Case 4371,	Staphylococcus pyogenes albus Bacillus coli communis Yeast
Peritoneal fluid,	Case 4140,	Streptococcus Staphylococcus pyogenes aureus Bacillus coli communis
Appendix,	Case 3907,	Streptococcus Bacillus coli communis
Vegetative endocarditis,	Case 3638,	Negative
Pericardial fluid,	Case 4140,	Negative
Acute pericarditis,	Case 3792,	Streptococcus
Gall-bladder,	Case 903,	Negative
	Case 3887,	Streptococcus Bacillus coli communis
Otitis media,	Case 3548,	Streptococcus Staphylococcus pyogenes aureus Bacillus (unidentified)
Caries of sternum,	Case 3949,	Staphylococcus pyogenes aureus
Trachea,	Case 4415,	Streptococcus Staphylococcus pyogenes albus Staphylococcus pyogenes aureus Bacillus (unidentified)

J. WILLOUGHBY IRWIN.

THE RELATION OF THE PNEUMOCOCCUS TO HEMORRHAGE.*

Although the evidence brought out in our first report on this subject last year was not sufficient to prove that the pneumococcus was the cause of epidemic hemorrhages, it was sufficient to encourage us to pursue this idea further.

Last year we studied the unwashed non-hemorrhagic sputum of thirteen cases, the washed non-hemorrhagic sputum of twelve, the blood-streaked sputum of twenty, and the definite hemorrhages of sixteen. Out of the thirteen cases in which unwashed non-hemorrhagic sputum was both stained and injected into mice the pneumococcus was found once on staining, and was recovered three other times from the blood of the mice (30%). Out of the twelve cases in which non-hemorrhagic sputum was washed with sterile salt solution and injected into mice, the pneumococcus was recovered twice (17%). Out of the twenty cases in which the blood-streaked sputum was either stained or injected into mice the pneumococcus was found fifteen times (75%). Out of the sixteen cases in which a definite hemorrhage was stained or injected into mice the pneumococcus was found eight times (50%). In other words, the non-hemorrhagic sputum of twenty-five cases showed the pneumococcus in 24%, the blood-streaked or hemorrhagic sputum of thirty-six cases showed the pneumococcus in 63%. The following are the details for the current year

* The bacteriological work which forms the basis of this article was done by Dr. J. W. Irwin; the tabulation, analysis, and review by Dr. Joseph Walsh.

RESULTS OF STAINING AND INOCULATION OF UNWASHED NON-HEMORRHAGIC SPUTUM.

Number of Case.	Date.	Micro-organisms Found in Stained Sputum.			Recovered from Blood of Mouse.	
		Pneumo-coccus.	Strepto-coccus.	Influenza Bacillus.	Pneumococcus by Staining.	Pneumococcus in Culture.
301.....	2 : 10 : '06	+	N	o	Mouse lived	
1238.....	2 : 7 : '06	o	N	+	+	+
1975.....	2 : 3 : '06	N	N	N	Mouse lived	
2022.....	9 : 25 : '06	o	+	o	+	+
3052.....	2 : 13 : '06	o	N	o	Mouse lived	
3170.....	2 : 2 : '06	+	N	+	+	+
3188.....	2 : 20 : '06	o	N	o	+	+
3201.....	3 : 13 : '06	o	+	o	+	+
3224.....	2 : 7 : '06	o	N	+	+	+
Same case ...	9 : 25 : '06	o	+	o	o	+
3441.....	2 : 13 : '06	o	N	o	Mouse lived	
3647.....	2 : 12 : '06	o	N	o	N	N
3736.....	2 : 3 : '06	N	N	N	Mouse lived	
3741.....	2 : 7 : '06	o	N	o	+	+
3792.....	2 : 2 : '06	o	N	o	Mouse lived	
3887.....	2 : 20 : '06	o	N	+	N	+
3899.....	3 : 13 : '06	o	+	o	Mouse lived	
3907.....	2 : 20 : '06	+	N	o	+	+
3923.....	2 : 20 : '06	+	N	o	+	+
3931.....	4 : 28 : '06	o	+	o	+	N
3963.....	3 : 13 : '06	o	+	o	Mouse lived	
4046.....	6 : 26 : '06	o	+	+	N	N
4075.....	6 : 26 : '06	o	+	+	+	+
4201.....	6 : 23 : '06	o	+	o	+	+
4237.....	6 : 22 : '06	o	+	o	+	+
4258.....	9 : 25 : '06	o	+	o	o	o
4364.....	11 : 15 : '06	o	+	o	+	+
4481.....	9 : 25 : '06	o	+	o	Mouse lived	

+ signifies positive, o negative, and N not recorded.

The table shows that the unwashed non-hemorrhagic sputum of twenty-five cases was stained and the pneumococcus was found in four. The same sputum from twenty-three of the cases was injected into mice and the pneumococcus was recovered from the blood of the mouse either by staining or by culture in fifteen. The sputum of two additional cases was injected into mice, but the mouse lived in both instances. Altogether the unwashed non-hemorrhagic sputum of twenty-seven cases

was stained or injected and the pneumococcus was found in one or both ways in sixteen (59%).

RESULTS OF STAINING AND INOCULATION OF BLOOD-STREAKED SPUTUM.

Number of Case.	Date.	Micro-organisms Found in Stained Sputum.		Recovered from Blood of Mouse.	
		Pneumo-coccus.	Strepto-coccus.	Pneumococcus by Staining.	Pneumococcus in Culture.
1092	12 : 29 : '06	o	+	+	+
1628	2 : 2 : '07	o	o	+	+
1656	1 : 14 : '06	+	+	Not inoculated	
Same case	6 : 23 : '06	+	+	N	+
2121	4 : 7 : '06	o	+	+	N
2958	2 : 27 : '06	o	+	Not inoculated	
3400	3 : 12 : '06	o	N	Not inoculated	
3510	1 : 14 : '06	+	N	Not inoculated	
3645	3 : 13 : '06	o	+	N	N
3731	3 : 13 : '06	o	+	N	N
3741	3 : 14 : '06	+	+	N	N
3855	4 : 7 : '06	+	+	+	+
3871	2 : 12 : '06	o	N	o	o
3873	3 : 14 : '06	+	+	N	N
3899	4 : 24 : '06	o	+	Mouse lived	
3948	1 : 9 : '07	o	+	+	+
3997	6 : 7 : '06	+	+	o	+
Same case	11 : 15 : '06	o	+	Mouse lived	
Same case	11 : 24 : '06	o	+	Mouse lived	
4006	12 : 8 : '06	+	+	o	o
4051	4 : 24 : '06	+	+	Mouse lived	
4061	4 : 14 : '06	N	N	+	+
4243	6 : 23 : '06	o	+	N	N
4321	11 : 15 : '06	o	+	o	o
4415	12 : 7 : '06	o	+	o	o
4521	1 : 16 : '07	o	+	+	+
4555	12 : 6 : '06	o	+	Mouse lived	
4587	12 : 6 : '06	o	+	+	+

The table shows that the blood-streaked sputum of twenty-four cases was stained and the pneumococcus was found in eight. The same blood-streaked sputum of twenty-one of these cases was injected into mice and the pneumococcus was recovered from the blood of the mouse either by staining or by culture in nine. Further, the sputum of one additional case was injected into a mouse and the pneumococcus was recovered. Altogether the blood-streaked sputum of twenty-five cases was stained or

injected and the pneumococcus was found in one or both ways in fifteen (60%).

RESULTS OF STAINING AND INOCULATION OF A DEFINITE HEMORRHAGE.

Number of Case.	Date.	Micro-organisms Found on Staining.			Recovered from Blood of Mouse.	
		Pneumococcus.	Streptococcus.	Influenza Bacillus.	Pneumococcus by Staining.	Pneumococcus in Culture.
1656.....	4 : 12 : '06	o	+	o	+	+
2209.....	2 : 17 : '06	N	N	N	+	N
Same case ...	2 : 9 : '06	N	N	N	o	N
3188.....	4 : 7 : '06	o	+	o	+	+
3873.....	4 : 28 : '06	o	+	o	o	o
Same case ...	6 : 14 : '06	o	+	+	N	N
3961.....	12 : 6 : '06	o	+	o	+	+
3997.....	6 : 2 : '06	+	+	N	Mouse lived	
4137.....	7 : 25 : '06	o	+	o	o	o
4142.....	10 : 16 : '06	o	+	o	+	+
4248.....	8 : 6 : '06	o	+	o	+	+
4316.....	12 : 28 : '06	o	+	o	o	o
4462.....	12 : 28 : '06	o	+	o	Mouse lived	
4577.....	1 : 22 : '07	o	+	o	+	+

The table shows that definite hemorrhagic sputum of twelve cases was stained and the pneumococcus was found in one case. The same hemorrhagic sputum of the twelve cases was injected into mice and the pneumococcus was recovered from the blood of the mouse either by staining or by culture in seven cases. Altogether in the twelve cases in which the hemorrhagic sputum was stained and injected the pneumococcus was found eight times (66%).

The table on page 394 shows the bacteriological findings in the tissues of the fifteen patients whose sputum was studied and who have since died. Of these fifteen, the first seven are cases whose sputum showed no blood at the time it was examined, and the last eight, cases whose sputum was either blood-streaked or hemorrhagic. Of the first seven, two cases (Nos. 1975 and 3441) showed no pneumococcus in the sputum, yet showed

BACTERIOLOGICAL STUDY OF CASES AUTOPSIED.

NON-HEMORRHAGIC CASES.

Number of Case.	Date Autopsied.	In Lung Cavities.											In Kidneys.					In Liver.			
		Pneumococcus.	Streptococcus.	Staphylococcus aureus.	Pseudodiphtheria Bacillus.	Bacillus coli communis.	Staphylococcus albus.	Unidentified Bacillus.	Sarcina.	Yeast.	Bacillus pyocyaneus.	Bacillus megatherium.	Streptococcus.	Staphylococcus aureus.	Staphylococcus albus.	Bacillus coli communis.	Yeast.	Streptococcus.	Bacillus coli communis.	Staphylococcus aureus.	Unidentified bacillus.
1975.....	2 : 20 : '06	+	o	o	o	o	o	o	+	o	o	o	o	o	o	o	o	o	o	o	o
3052.....	2 : 22 : '06	o	+	+	o	+	o	o	o	o	o	o	o	o	o	+	o	o	o	o	o
3441.....	3 : 29 : '06	+	+	+	o	+	o	o	o	+	o	o	o	o	o	o	o	o	o	o	o
3792.....	3 : 13 : '06	o	+	o	o	+	+	o	o	o	o	o	o	o	o	o	o	o	o	o	o
3887.....	3 : 24 : '06	+	+	o	o	+	o	o	o	o	o	o	+	o	o	o	o	+	o	o	o
3907.....	3 : 31 : '06	o	+	+	o	+	o	+	o	+	o	o	+	o	o	+	o	o	o	o	o
4364.....	11 : 26 : '06	+	o	+	+	o	+	o	o	o	o	o	o	o	+	o	+	o	o	o	o

HEMORRHAGIC CASES.

3731.....	4 : 5 : '06	+	+	o	o	+	+	o	o	o	o	o	o	o	o	o	o	o	o	o	o
3961.....	12 : 4 : '06	+	+	+	o	+	+	o	o	o	o	o	o	+	o	+	o	o	o	o	o
4243.....	6 : 25 : '06	o	+	+	o	+	o	o	o	o	+	+	o	o	o	o	o	o	o	+	+
4248.....	8 : 6 : '06	+	+	o	o	+	o	o	o	o	o	o	o	o	o	+	o	o	o	o	o
4316.....	12 : 26 : '06	+	+	o	o	+	o	o	o	o	o	o	o	o	o	+	o	o	o	o	o
4415.....	12 : 9 : '06	o	+	+	o	+	+	o	o	o	o	o	+	+	+	+	o	o	o	o	o
4462.....	1 : 3 : '06	o	+	o	o	+	+	o	o	o	o	o	+	o	o	o	o	o	o	o	o
4587.....	12 : 15 : '06	o	+	o	o	+	+	o	o	+	o	o	+	o	o	+	o	+	o	o	o

it in the lung cavities; one case (No. 3907) showed it in the sputum, but not in the lung; two cases (Nos. 3887 and 4364) showed it both in the sputum and in the lung cavities; and two cases (Nos. 3052 and 3792) failed to show it either in the sputum or in the lungs. Altogether, therefore, the pneumococcus was found either in the sputum or in the lungs of twenty-seven patients with non-hemorrhagic sputum eighteen times (67%).

Of the last eight cases, two (Nos. 3731 and 4316) showed no pneumococcus in the sputum, yet showed it in the lung cavities; one case (No. 4587) showed it in the sputum, but not in the lung cavities; two cases (Nos. 3961 and 4248) showed it both in the sputum and in the lung cavities; and three cases (Nos. 4243, 4415, and 4462) showed it neither in the sputum nor in the lung cavities. Altogether, therefore, the pneumococcus was found either in the sputum or lungs of thirty-seven patients with blood-streaked or hemorrhagic sputum twenty-five times (67%).

SUMMARY.

In the cases for two years the non-hemorrhagic sputum of fifty-two cases showed the pneumococcus in 42%, the blood-streaked or hemorrhagic sputum of seventy-three cases showed it in 63%.

JOSEPH WALSH.

COMPARISON OF RESULTS OF CASES AT THE WHITE HAVEN SANATORIUM AND THE HENRY PHIPPS INSTITUTE.

This comparison of results of treatment of cases at the White Haven Sanatorium, which is at an altitude of sixteen hundred feet, and the Henry Phipps Institute dispensary and hospital, which is in the center of the slums of a large city, was undertaken with a full realization that the various differences in the two places made a comparison unjustifiable. The results show that among the poorer classes the early cases do better at the White Haven Sanatorium than in the Phipps Institute dispensary, the advanced cases better in the Phipps Institute hospital than in the White Haven Sanatorium. The comparison of the advanced cases in both places is evidently justifiable, since these cases are treated in bed; the comparison of the early cases is scarcely justifiable, since the early cases at White Haven are on rest and enforced discipline, while the early cases at the Phipps are living at home in the slums of a large city, many of them working, and all see the physician only once in two weeks.

RESULTS OF TREATMENT OF CASES AT THE WHITE HAVEN SANATORIUM DURING THE YEAR 1906.

The Sanatorium was opened in 1901, and practically for the first five years took only free cases. In 1905 it had a certain number of beds at an average price of about five dollars per week, continuing one hundred beds absolutely free. This arrangement still remains, except that the charge for the pay beds has been raised to seven dollars per week.

Up till the beginning of the year 1906 the Sanatorium was supposed to take only the early cases of tuberculosis, but with examining physicians all over the State the tuberculosis experience of some being small, quite a number of cases always crept in that were not early cases. Since the entrance of later stage cases could not be absolutely prevented, there was established at the beginning of 1906 what was called a No. 2 Department, for somewhat more advanced cases. The Sanatorium has been taking, therefore, both classes of cases since then. No. 2 Department accommodates twenty men and sixteen women. In the other departments there are one hundred and sixty altogether.

When patients are improving they are urged to remain six months, in order that they may go home in good condition. The great majority of cases detailed remained about five months. Since in the Turban scheme of classification a case must be at least three months without symptoms in order to be classified as apparently cured, it is natural that we would not have many apparently cured. The majority of our cases, as far as results are concerned, fall under the head "arrested."

DIAGNOSIS ON ADMISSION TO SANATORIUM.

	Males.	Females.	Total.
Incipient,.....	126	77	203 (22%)
Moderately advanced,.....	346	240	586 (63%)
Far advanced,.....	95	50	145 (16%)
Total,.....	567	367	934

Of these nine hundred and thirty-four cases in the Sanatorium in 1906, one hundred and fifteen did not remain long enough to be considered treated. These one hundred and fifteen cases were divided up as follows: incipient, fifteen; moderately advanced, sixty-two; far advanced, thirty-eight. Omitting these, we have eight hundred and nineteen treated cases, the statistics of which are as follows:

	Males.	Females.	Total.
Incipient, apparently cured,.....	48	20	68 (36%)
Incipient, arrested,.....	34	40	74 (39%)
Incipient, improved,.....	29	11	40 (21%)
Incipient, unimproved,.....	0	1	1 (0.53%)
Incipient, progressive,.....	3	2	5 (3%)
Incipient, died,.....	0	0	0
	114	74	188
Moderately advanced, apparently cured,.....	17	10	27 (5%)
Moderately advanced, arrested,.....	115	97	212 (40%)
Moderately advanced, improved,.....	127	83	210 (40%)
Moderately advanced, unimproved,.....	6	0	6 (1%)
Moderately advanced, progressive,.....	43	24	67 (13%)
Moderately advanced, died,.....	0	2	2 (0.4%)
	308	216	524
Far advanced, apparently cured,.....	0	0	0
Far advanced, arrested,.....	6	1	7 (7%)
Far advanced, improved,.....	25	8	33 (31%)
Far advanced, unimproved,.....	3	8	11 (10%)
Far advanced, progressive,.....	33	16	49 (46%)
Far advanced, died,.....	6	1	7 (7%)
	73	34	107

I am indebted for these statistics to the following resident physicians at the White Haven Sanatorium: Dr. H. J. Blankemeyer, Dr. John J. Craig, Dr. M. E. Topham, and Dr. H. Z. O'Brien.

RESULTS OF TREATMENT OF CASES AT THE HENRY PHIPPS INSTITUTE DURING THE YEAR 1906.

The Henry Phipps Institute has both a hospital and a dispensary. The hospital accommodates fifty-two beds. During 1906 one hundred and sixty-seven patients were treated in the hospital and five hundred and sixty-seven in the dispensary. The hospital is primarily intended for advanced cases of tuberculosis. Since the majority of cases admitted are advanced, it is perfectly natural that the most common result would be progression of the disease. The principal object of the hospital is prevention. It takes the poor workman from his home, where he has not sufficient care, and where he is probably infecting other members of the family, and gives him a proper place in which he may improve, if that is possible, and in which at least further contagion of the family is prevented.

All sorts of patients come to the dispensary, from the one who has come to have merely a physical examination and diagnosis made, and who is still a very early case, to far advanced cases.

The results in the dispensary cases are somewhat unsatisfactory on account of the frequency with which they stop treatment after the first, second, or third visit. Out of the seven hundred and thirty-four cases that came into the hospital and dispensary in 1906, there were only one hundred and ninety-one that remained in the hospital or came to the dispensary for treatment longer than three months.

Of this number, thirty-seven were incipient, ninety-one moderately advanced, and sixty-three far advanced. In all cases the time over which the patients were seen was insufficient to record anything like an apparent cure, and in the great majority of cases the time was too short to record arrest. The statistics, however, are still worth while quoting in order to show what can be done for such a class of cases, all of them in destitute circumstances in the slum district of a large city.

	Dispensary Cases.	Hospital Cases.	Cases at Different Times in Dispensary and Hospital.
Incipient, apparently cured,	0	0	0
Incipient, arrested,	6 (16%)	0	0
Incipient, improved,	27 (73%)	0	0
Incipient, unimproved,	4 (11%)	0	0
Incipient, died,	0	0	0
	37	0	0
Moderately advanced, apparently cured,	0	0	0
Moderately advanced, arrested,	0	0	0
Moderately advanced, improved,	53 (67%)	4 (100%)	2 (25%)
Moderately advanced, unimproved,	22 (28%)	0	2 (25%)
Moderately advanced, died,	4 (5%)	0	4 (50%)
	79	4	8
Far advanced, apparently cured,	0	0	0
Far advanced, arrested,	0	0	0
Far advanced, improved,	7 (35%)	14 (48%)	4 (29%)
Far advanced, unimproved,	9 (45%)	9 (31%)	5 (36%)
Far advanced, died,	4 (20%)	6 (21%)	5 (36%)
	20	29	14

These statistics differ from the statistics of results in the paper "Clinical and Sociological Report of the Year" because in the latter all cases were included, while I have only considered the cases treated over three months. The results given in that paper are:

	Dispensary.	Hospital.
Disease arrested,	7	0
Improved,	221	50
Unimproved,	186	68
Died,	20	49
Made one visit,	133	0
Total,	567	167

COMPARISON OF THE RESULTS OF TREATMENT OF CASES AT THE WHITE HAVEN SANATORIUM AND THE HENRY PHIPPS INSTITUTE.

We have been obliged to divide the Phipps Institute cases into those which were treated in the hospital and those which were treated only in the dispensary, because the cases in the hospital are on enforced discipline, while the cases in the dispensary are living under poor home conditions and frequently working, thereby giving themselves little opportunity for improvement or arrest.

For exactly the same reason as the cases in the Phipps Institute dispensary and hospital cannot be combined or compared, the cases in the Phipps Institute dispensary and the White Haven Sanatorium ought not be compared. Moreover, since the early cases at the Phipps Institute dispensary are living under adverse conditions, and at the White Haven Sanatorium under practically ideal conditions, it is natural that they should do better in the latter place.

It is possible, however, to compare the far advanced cases at the White Haven Sanatorium and in the Phipps Institute hospital, because in both instances they are in institutions on enforced discipline. In these cases the statistics are better in the Phipps Institute hospital. These statistics show 38% of

arrest and improvement at White Haven compared with 42% improvement at the Phipps hospital, and 63% unimprovement and death at White Haven compared with 59% at the Phipps hospital. Moreover, these cases show better in practice than in statistics, for we often find cases doing very badly at the White Haven Sanatorium reverse their condition and improve at the Phipps hospital.

The reasons for this are not easy of determination. In my own experience and that of some others at the Institute there are several classes of advanced cases that seem to do better at the Phipps Institute than at the White Haven Sanatorium: namely, first, the cases with considerable involvement who are breathing rapidly. These cases apparently do badly at the White Haven Sanatorium because they have already all the tax that they can bear on their respiratory function, and the additional tax added by even the slight altitude of sixteen hundred feet proves the last straw which they cannot bear; secondly, the cases manifesting acute toxemia due either to the tubercle bacillus or to a pus-producing micro-organism and associated with a high temperature or a rapid pulse, particularly the latter. It is likely that the same general reason holds in these cases, since the altitude increases the rapidity of the pulse.

Another reason for the greater improvement of the advanced cases at the Phipps Institute is that the Phipps Institute is intended for advanced cases of tuberculosis and has many more nurses, in comparison with the number of patients, than the White Haven Sanatorium, which insures better nursing and greater care.

	White Haven Sanatorium.	Phipps Institute.	
		Dispensary.	Hospital.
Incipient, apparently cured,	68 (36%)	0	0
Incipient, arrested,	74 (39%)	6 (16%)	0
Incipient, improved,	40 (21%)	27 (73%)	0
Incipient, unimproved,	6 (3%)	4 (10%)	0
Incipient, died,	0	0	0
	188	37	0

	White Haven Sanatorium.	Phipps Institute.	
		Dispensary.	Hospital.
Moderately advanced, apparently cured,	27 (5%)	0	0
Moderately advanced, arrested,	212 (40%)	0	0
Moderately advanced, improved,	210 (40%)	53 (67%)	6 (50%)
Moderately advanced, unimproved,	73 (14%)	22 (28%)	2 (17%)
Moderately advanced, died,	2 (0.4%)	4 (5%)	4 (33%)
	524	79	12
Far advanced, apparently cured,	0	0	0
Far advanced, arrested,	7 (7%)	0	0
Far advanced, improved,	33 (31%)	7 (35%)	18 (42%)
Far advanced, unimproved,	60 (56%)	9 (45%)	14 (33%)
Far advanced, died,	7 (7%)	4 (20%)	11 (26%)
	107	20	43
Grand total,	819	136	55

JOSEPH WALSH.

THE TRAINING SCHOOL FOR NURSES OF THE HENRY PHIPPS INSTITUTE.

The Training School has been in existence for over three years, and its success from the standpoint of hospital efficiency has been fairly well tested. There is little doubt that it is at present the best solution of the problem of providing proper care for tuberculous patients. The experiment also has clearly shown that for the employment of selected young women in whom the disease has been arrested the profession of nursing offers great promise.

During the year 1906 the curriculum was somewhat amplified so as to differentiate more sharply the work of senior and junior pupils.

The records of the physical condition of our nurses continue to prove satisfactory, especially when it is known that many of the probationers admitted to the School have been moderately advanced cases. The work is by no means easy; but since the training is planned with a view to having the work performed by pupils who are not in first-class condition, the results have been satisfactory.

All of the six graduates of last year are in good health and are filling remunerative positions. One of them is Superintendent of the Hospital of the Henry Phipps Institute; two are nurses in charge of wards in the Philadelphia Hospital; two are employed in sanatoria; and one is in charge of a tuberculosis dispensary.

Six nurses were graduated in the year covered by this report. Five of these completed their course in good physical condition

and are employed in sanatoria or hospitals. The sixth nurse broke down in health about the time of graduation, and is at present very ill.

The following are the graduates of 1906: Miss Elizabeth C. Carpenter, Miss Isabelle H. Hughes, Miss Anna Lavery, Miss Mary McNamee, Miss Margaret K. Patterson, Miss Mary Tierney.

GEORGE BACON WOOD,
Chairman Training School Committee.

SPECIAL INDEX OF CASES MENTIONED IN REPORT.

Case No.	Upper Respiratory Tract, 169 to 177.	Bones and Joints, 204 to 213.	Lymph Glands and Skin, 230 to 236.	Pleura, 265 to 269.	Weights of Organs, 317 to 320.	Bacteriology, 379 to 389.	Pneumococcus in Hæmorrhage, 391 to 395.
9	..	208	..	..	..	..	..
73	..	..	230	..	..	..	..
93	..	208	..	..	..	..	..
136	..	..	230	..	..	..	..
172	..	..	230	..	..	..	..
174	..	208	..	..	..	..	..
186	..	..	230	..	..	..	..
301	..	..	..	..	..	..	391
336	..	..	230	..	..	..	..
366	..	204,209	..	..	..	..	..
383	..	..	230	..	..	..	..
424	..	..	230	..	..	..	..
483	..	..	230	..	..	..	..
499	..	209	..	..	..	..	..
577	..	..	230	..	..	..	..
623	..	..	230	..	..	..	..
649	..	209	..	..	..	..	..
655	..	..	230	..	..	..	..
664	..	209	..	..	..	..	..
693	..	210	..	..	..	..	..
785	..	204,210	..	..	..	..	..
821	..	204,210	..	..	..	..	..
824	..	210	..	..	..	..	..
836	..	..	230	..	..	..	..
845	..	211	..	..	..	..	..
864	..	204,211	..	..	..	..	..
901	..	211	..	..	..	..	..
903	169	..	..	270	317	379,389	..
991	..	204,212	..	..	..	..	..
1010	..	..	230	..	..	..	..

Figures refer to page upon which detailed report is given.

Case No.	Throat and Nose, 160 to 161.	Bones and Joints, 204 to 223.	Lymph Glands and Skin, 230 to 236.	Nervous System, 238 to 263.	Pleura, 265 to 289.	Lungs, Clinically and Pathologically, 290 to 314.	Weights of Organs, 317 to 320.	Bacteriology, 379 to 389.	Pneumococcus in Hemorrhage, 391 to 395.
1015	..	..	231	..	..	..	..	..	..
1062	..	..	..	255	..	..	..	..	..
1070	..	..	231	..	..	..	..	..	..
1091	..	212	..	..	..	..	..	..	..
1092	..	..	..	..	..	..	..	..	392
1142	..	..	231	..	..	..	..	..	..
1170	..	..	231	..	..	..	..	..	..
1221	..	..	231	..	..	..	..	..	..
1238	..	..	..	..	..	..	..	..	391
1287	..	..	231	..	..	..	..	..	..
1543	..	204,212	..	..	..	..	..	..	..
1577	..	..	231	..	..	..	..	..	..
1603	..	..	231	..	..	..	..	..	..
1628	..	..	..	..	..	..	..	..	392
1639	..	213	..	..	..	..	..	..	..
1642	..	..	231	..	..	..	..	..	..
1646	..	..	231	..	..	..	..	..	..
1656	..	..	..	..	..	..	..	..	392,393
1698	..	..	231	..	..	..	..	..	..
1827	..	..	231	..	..	..	..	..	..
1835	..	..	231	..	..	..	..	..	..
1872	..	..	231	..	..	..	..	..	..
1875	..	..	231	..	..	..	..	..	..
1923	..	213	..	..	..	..	..	..	..
1941	..	..	231	..	..	..	..	..	..
1951	..	..	231	..	..	..	..	..	..
1956	..	..	232	..	..	..	..	..	..
1975	..	..	..	..	268, 275, 278	..	317	379	391, 393, 394, 395,
1984	..	..	232	..	..	..	..	..	..
2003	..	204,213	..	..	..	..	..	..	..
2013	..	213	232	..	..	..	..	..	..
2019	..	..	..	250	266	290, 304, 307, 308, 309, 310, 311, 312, 314	317	379	..
2022	..	..	..	..	..	..	..	..	391
2055	..	..	232	..	..	..	..	..	..
2056	160	..	..	..	..	..	..	..	..
2082	..	214	232	..	..	..	..	..	..

Figures refer to page upon which detailed report is given.

Case No.	Upper Respiratory Tract, 169 to 177.	Bones and Joints, 204 to 223.	Lymph Glands and Skin, 230 to 236.	Weights of Organs, 317 to 320.	Bacteriology, 379 to 389.	Pneumococcus in Hemorrhage, 391 to 395.
2090	..	214	232	..	..	..
2100	..	..	232	..	..	..
2121	..	..	..	..	..	392
2131	..	..	232	..	..	..
2141	..	..	232	..	..	..
2143	..	..	232	..	..	..
2149	..	..	232	..	..	..
2180	..	..	232	..	..	..
2193	..	..	232	..	..	..
2209	..	..	..	..	..	393
2223	..	..	233	..	..	..
2226	..	..	233	..	..	..
2229	..	..	233	..	..	..
2276	..	..	233	..	..	..
2281	..	..	233	..	..	..
2285	..	..	233	..	..	..
2313	..	..	233	..	..	..
2324	..	..	233	..	..	..
2329	..	..	233	..	..	..
2331	..	..	233	..	..	..
2363	..	..	233	..	..	..
2366	..	..	233	..	..	..
2371	..	..	233	..	..	..
2380	..	..	233	..	..	..
2474	..	214	..	..	..	..
2497	..	..	233	..	..	..
2507	..	..	233	..	..	..
2616	..	..	233	..	..	..
2632	169	..	..	..	..	..
2668	..	..	234	..	..	..
2684	..	..	234	..	..	..
2727	169, 170	..	..	317	379	..
2732	..	..	234	..	..	..
2750	..	..	234	..	..	..
2780	..	..	..	..	388	..
2783	..	..	234	..	..	..
2801	..	..	234	..	..	..
2811	..	..	234	..	..	..
2817	..	..	234	..	..	..

Figures refer to page upon which detailed report is given.

Case No.	Urine, 123 to 140.	Throat and Nose, 160 to 161.	Upper Respiratory Tract, 169 to 177.	Bones and Joints, 204 to 213.	Lymph Glands and Skin, 230 to 236.	Nervous System, 238 to 263.	Pleura, 265 to 289.	Lungs, Clinically and Pathologically, 290 to 314.	Weights of Organs, 317 to 380.	Bacteriology, 379 to 389.	Pneumococcus in Hemorrhage 391 to 395.
2828	..	..	..	..	..	..	..	..	..	388	..
2835	..	..	..	..	234	..	..	..	..	..	..
2858	..	..	..	214	..	..	..	..	..	..	..
2861	..	..	..	..	..	238	..	..	317	379	..
2885	..	..	..	..	234	..	..	..	..	..	..
2891	..	..	..	..	234	..	..	..	..	..	..
2907	..	..	..	215	234	..	..	..	..	..	..
2910	..	..	..	..	234	..	..	..	..	..	..
2923	130	..	..	..	..	..	..	..	..	..	..
2949	..	..	..	..	234	..	..	..	..	..	..
2956	126, 127	..	..	..	..	..	..	..	..	..	..
2958	..	..	..	..	..	..	..	..	..	..	392
2980	..	..	170	..	..	..	266	291, 304, 306, 309, 310, 311, 314	317	379	..
2982	..	..	..	215	..	..	..	..	..	..	..
3000 ..	..	.. ..	..	204, 215	.. ..	.. ..	..	..	..	..	..
3052	..	..	170	..	..	238, 239	268	..	317	379	391, 394, 395
3077	..	..	..	216	..	..	..	..	..	..	..
3084	..	..	..	..	234	..	..	..	..	..	..
3092	..	161	..	..	..	..	..	..	..	..	..
3110	..	..	..	216	..	..	..	..	..	..	..
3119	..	..	..	..	..	..	268	..	317	379	..
3170	..	..	..	..	..	..	..	..	..	..	391
3182	..	..	170	..	..	..	..	..	..	..	..
3186	..	..	..	..	234	..	..	..	..	..	..
3188	..	..	..	..	..	..	..	..	..	..	391, 393
3201	..	..	..	..	..	..	..	..	..	..	391
3224	..	..	..	..	235	..	..	..	..	..	391
3253	..	..	170	..	..	..	..	..	..	..	..
3255	..	..	..	216	..	..	..	..	..	..	..
3273	..	..	..	216	..	..	..	..	..	..	..
3347	..	..	..	..	235	..	..	..	..	..	..
3393	..	..	171	..	235	245	267, 274, 278	..	317	379	..

Figures refer to page upon which detailed report is given.

Case No.	Urine, 123 to 140.	Throat and Nose, 160 to 161.	Upper Respiratory Tract, 169 to 177.	Bones and Joints, 204 to 223.	Lymph Glands and Skin, 230 to 236.	Nervous System, 238 to 263.	Pleura, 265 to 289.	Lungs, Clinically and Pathologically, 290 to 314.	Weights of Organs, 317 to 320.	Bacteriology, 379 to 389.	Pneumococcus in Hemorrhage, 391 to 395.
3400	..	..	..	..	..	..	..	..	..	..	392
3405	..	..	171	..	..	..	..	..	..	..	..
3412	..	..	..	217	..	..	..	..	..	..	..
3432	..	..	..	..	235	..	..	..	..	..	..
3441	138	..	171	..	..	..	..	..	317	379, 388	391, 393, 394
3471	..	..	..	217	..	..	..	..	..	..	..
3489	..	..	..	217	..	..	..	..	..	..	..
3509	..	..	..	..	235	..	..	..	..	..	..
3510	..	..	..	..	..	..	..	..	..	..	392
3526	..	..	171	..	..	..	..	..	..	..	..
3528	..	..	..	..	235	..	..	..	..	..	..
3537	..	..	177	..	..	..	..	..	..	..	..
3545	..	..	..	..	235	..	..	..	..	..	..
3548	..	..	171	..	..	..	269	293, 304, 306, 307, 310, 312, 313	317	379, 388, 389	..
3559	..	..	172	..	..	..	..	..	..	..	..
3584	..	..	..	..	235	..	..	..	..	..	..
3625	..	..	..	218	..	..	..	..	..	..	..
3633	..	..	172	..	..	..	..	..	..	..	..
3635	..	..	..	..	..	253	..	..	..	..	..
3638	..	..	..	..	..	..	..	..	..	379, 389	..
3640	130	..	..	..	..	..	..	..	..	..	..
3643	126, 127,	..	172	..	..	..	269, 275, 278	..	317	379	..
3645	..	..	..	..	..	..	..	..	..	..	392
3647	..	..	..	..	..	..	..	..	..	..	391
3649	..	161	..	..	..	..	..	..	..	..	..
3666	..	..	..	218	..	..	..	..	..	..	..
3677	..	..	172	..	..	..	270	..	317	379	..
3697	..	..	173	..	..	..	..	..	..	..	..
3699	..	..	177	..	..	..	..	..	..	..	..
3731	..	..	..	..	..	254, 256	267, 276, 277	..	317	379	392, 394, 395
3736	..	..	..	..	..	..	..	..	..	..	391
3741	..	..	..	..	..	..	..	..	..	..	391, 392
3749	..	..	173	..	..	..	..	..	..	388	..

Figures refer to page upon which detailed report is given.

Case No.	Urine, 123 to 140.	Upper Respiratory Tract, 169 to 177.	Bones and Joints, 204 to 223.	Lymph Glands and Skin, 230 to 236.	Nervous System, 238 to 263.	Pleura, 265 to 280.	Lungs, Clinically and Pathologically, 290 to 314.	Weights of Organs, 317 to 320.	Bacteriology, 379 to 389.	Pneumococcus in Hemorrhage, 391 to 395.
3762	..	..	..	235	..	..	..	..	..	..
3772	..	..	204, 218	235	..	..	..	..	..	..
3792	..	..	..	..	..	269	..	317	379, 389	391, 394, 395
3800	..	..	..	235	..	..	..	..	..	..
3831	138	173	..	..	..	268, 274, 287	..	318	379	..
3848	..	..	..	235	..	..	..	..	..	..
3855	..	..	..	..	..	..	..	..	..	392
3859	126, 127, 138	..	..	..	..	..	..	..	..	..
3871	..	..	..	235	..	..	..	..	..	392
3873	..	..	..	..	..	..	..	..	..	392, 393
3880	..	173	..	..	..	272, 275, 277	..	318	379	..
3887	..	173	..	..	252	271, 273, 278	..	318	379, 389	391, 394, 395
3896	..	176	..	..	..	271	295, 304, 308, 309, 310, 311, 312, 313, 314	318	379	..
3899	..	..	..	..	..	..	..	..	..	391, 392
3907	..	174	..	..	..	270, 273 274, 275, 277	..	318	379, 389	391, 394, 395
3915	..	..	..	..	254	..	..	..	..	..
3918	..	174	..	..	..	..	..	318	380	..
3923	..	..	..	..	..	..	..	..	..	391
3931	..	..	..	..	..	270	..	318	..	391
3941	..	174	..	..	252	270, 276, 278	..	318	380	..
3948	..	..	..	..	..	..	..	..	..	392
3949	..	..	204, 218	..	..	270	..	318	380, 389	..
3953	..	174	..	..	251, 252	266	..	318	380	..
3960	..	..	204, 219	..	..	..	..	..	..	..
3961	..	..	..	..	..	271, 275, 277	..	318	380, 388	393, 394, 395

Figures refer to page upon which detailed report is given.

Case No.	Urine, 123 to 140.	Upper Respiratory Tract, 169 to 177.	Bones and Joints, 204 to 223.	Lymph Glands and Skin, 230 to 236.	Nervous System, 238 to 263.	Pleura, 265 to 289.	Lungs, Clinically and Pathologically, 290 to 314.	Weights of Organs, 317 to 320.	Bacteriology, 379 to 389.	Pneumococcus in Hæmorrhage, 391 to 395.
3963	..	..	..	..	..	..	..	..	..	391
3981	..	..	219	..	..	..	..	..	..	..
3994	..	..	..	235	..	..	..	..	..	..
3997	..	..	..	..	..	..	..	..	..	392, 393
4006	138	..	..	..	..	..	..	..	..	392
4008	..	..	..	235	..	..	..	..	..	..
4010	..	175	..	..	253	269	..	318	380	..
4021	..	175	..	..	..	269, 275, 277, 282	..	318	380	..
4023	..	176	..	..	238, 239, 263	266, 275, 277	..	318	380	..
4040	..	175	..	..	..	265, 269, 275, 277	..	318	380	..
4046	..	..	..	..	..	..	..	..	..	391
4051	..	..	..	..	..	..	..	..	..	392
4061	..	..	..	..	..	..	..	..	..	392
4075	..	..	..	235	253	..	..	..	..	391
4097	..	..	..	..	254	265, 272 274, 277	..	318	380	..
4116	..	177	204, 219	..	255	..	..	..	380, 389	..
4122	..	..	..	..	259	..	..	318	380, 388	..
4137	..	..	..	..	..	..	..	..	..	393
4140	..	177	..	..	..	..	..	319	380, 389	..
4141	..	175	..	..	251, 252	..	..	319	380	..
4042	..	..	..	..	..	..	..	..	..	393
4148	..	..	..	..	..	268, 269	296, 304, 306, 307, 309, 310, 311, 312, 313, 314,	319	380	..
4155	..	176	..	..	..	268, 275, 277	..	319	380	..
4159	..	..	..	..	..	277	..	..	..	..
4164	..	..	..	..	..	266, 275, 277	..	319	380	..
4168	..	..	..	..	..	276, 278,	..	319	380, 388	..
4169	..	..	219	..	..	..	..	..	..	..
4180	..	..	..	..	..	266, 273, 274, 278	..	319	380	..
4189	..	..	220	..	..	..	..	..	..	..

Figures refer to page upon which detailed report is given.

Case No.	Urine, 123 to 140.	Upper Respiratory Tract, 169 to 177.	Bones and Joints, 204 to 223.	Lymph Glands and Skin, 230 to 236.	Nervous System, 238 to 263.	Pleura, 265 to 289.	Lungs, Clinically and Pathologically, 290 to 314.	Weights of Organs, 317 to 320.	Bacteriology, 379 to 389.	Pneumococcus in Hemorrhage, 391 to 395.
4197	..	..	..	..	..	270	297, 304, 309, 310, 311, 312, 313	319	380	..
4198	..	..	..	..	..	265, 270	..	319	..	..
4201	..	..	..	..	..	..	..	..	..	391
4202	..	..	..	..	..	..	..	319	380	..
4221	..	..	..	..	..	266	..	319	381	..
4224	138	..	220	..	..	270	299, 304, 306, 308, 309, 310, 311, 312, 313	319	381	..
4232	..	..	..	..	245, 246	266	301, 304, 306, 307, 309, 310, 311, 312, 314	319	381	..
4237	..	..	..	..	..	..	..	..	..	391
4243	..	..	..	..	..	265, 271, 273, 284,	303, 308, 309, 310, 311, 313	319	381	392, 394 395
4246	..	..	..	..	..	268	..	319	381	..
4248	..	..	..	..	..	271	..	319	381	393, 394, 395
4258	..	..	..	..	..	..	..	..	..	391
4272	..	..	..	..	249	272, 275, 278, 283, 286	..	319	381	..
4281	..	176	..	..	..	266, 276, 278	..	319	381	..
4282	..	..	..	..	..	269	..	319	381	..
4287	..	..	..	..	245, 246	270, 275, 278	..	319	381	..
4296	..	..	220	..	..	..	..	..	..	..
4306	..	..	..	..	252	271	..	320	381	..
4311	..	..	..	235	..	..	..	..	..	..
4313	..	..	..	..	254	..	..	..	..	..
4316	..	..	..	..	..	268, 277	..	320	381	393, 394, 395
4321	..	..	..	..	..	..	..	..	..	392

Figures refer to page upon which detailed report is given.

Case No.	Displacement of Heart, 86.	Urine, 123 to 140.	Bones and Joints, 204 to 223.	Lymph Glands and Skin, 230 to 236.	Nervous System, 238 to 263.	Pleura, 265 to 289.	Weights of Organs, 317 to 320.	Bacteriology, 379 to 389.	Pneumococcus in Hemorrhage, 391 to 395.
4342	..	..	221	..	..	..	..	..	..
4344	..	..	..	..	255	..	..	..	..
4345	..	..	..	..	..	268, 273, 274, 276, 277	320	381	..
4364	..	..	..	..	..	265	320	381	391, 394, 395
4371	..	..	..	..	..	272, 275, 278	320	381, 389	..
4380	..	..	..	..	..	271	320	381	..
4382	..	..	..	..	253	..	..	..	..
4383	..	..	..	..	254	..	..	..	..
4403	..	..	221	236	..	..	..	..	..
4410	..	..	..	..	255, 256	..	..	..	..
4415	..	..	..	..	..	..	320	381, 389	392, 394, 395
4416	..	..	..	..	..	272	..	..	..
4431	..	..	204, 221	236	..	..	..	..	..
4452	..	..	204, 221	..	..	..	..	..	..
4455	..	..	..	..	258	..	..	..	..
4460	..	..	..	..	..	271, 275, 277	320	381	..
4461	..	..	222	236	..	..	..	..	..
4462	..	..	..	..	..	265, 266, 288	320	381	393, 394, 395
4474	..	..	..	..	255, 256	..	..	..	..
4481	..	..	..	..	..	..	..	..	391
4485	..	..	..	236	..	..	..	..	..
4500	..	..	..	..	..	265, 267	320	381	..
4518	..	..	222	..	..	..	..	..	..
4521	..	127	..	..	..	..	..	..	392
4522	..	..	..	..	..	268, 280, 284	320	381, 388	..
4553	..	..	..	236	..	..	..	..	..
4555	..	..	..	..	..	..	..	..	392
4577	..	..	..	..	..	..	..	..	393
4587	..	..	..	..	..	266	320	381	392, 394, 395
4603	..	..	222	236	..	..	..	..	..
4606	..	..	..	236	..	..	..	..	..
4659	..	..	..	..	..	269, 276	320	381	..
4667	..	..	..	236	..	..	..	..	..
4702	86	..	..	..	..	..	..	..	..

Figures refer to page upon which detailed report is given.

Case No.	Displacement of Heart, 86.	Urine, 123 to 140.	Bones and Joints, 204 to 223.	Lymph Glands and Skin, 230 to 236.	Nervous System, 238 to 263.	Pleura, 265 to 289.	Weights of Organs, 317 to 320.	Bacteriology, 379 to 389.
4719	..	..	..	..	..	271	..	381
4723	..	..	..	236	..	..	..	..
4735	86	..	..	236	..	265, 268, 277, 284, 289	320	381
4753	..	..	222	..	..	..	..	..
4778	..	..	..	236	..	..	..	..
4822	..	..	223	..	..	..	..	..
4920	..	123, 135, 139, 140	..	..	..	..	..	..
4963	..	130	..	..	..	..	..	..
5014	..	125	..	..	..	..	..	..
5039	..	130	..	..	259	..	..	..

Figures refer to page upon which detailed report is given.

INDEX.

ABDOMINAL viscera, diseases of, 75, 77, 348
position of, 327
Age and implantation of tuberculosis, 20
and lymph gland tuberculosis, 225
Cornet on mortality and, 15
in relation to albumin and casts in the urine, 145
of cases autopsied, 317–320
of patients, 20
population of Philadelphia according to, 20
relation of, to tuberculosis, 15, 20
Aid given to patients, 100
cost of, 103
Albumin and Casts in Pulmonary Tuberculosis, 120–157:
accentuated second aortic sound in relation to, 127, 148
age in relation to, 145
albuminuria, 120, 140
without casts, 122
amount of albumin, 122–126, 154
pulmonary involvement in relation to, 151
amyloid casts, 137
anorexia in relation to, 144
arteriosclerosis in relation to, 149
casts, 122–157
without albuminuria, 138
conclusions on, 154
constipation in relation to, 144
cylindroids, 140
diagnosis of, 130, 140
diarrhea and, 143
diet and, 125
duration of disease and, 153
edema and, 127, 147
frequency of albumin and casts, 122, 131, 134, 154
gastric disturbances and, 144
intestinal involvement and, 140, 143
on frequent examination, 123, 135
on last day of life, 129
origin of casts, 127
prognosis and, 139–152
results of cases and, 152
sex and, 146
specific gravity and, 150
Albumin and Casts in Pulmonary Tuberculosis:
tests for albuminuria, 120
tubercle bacilli and, 150
varieties of casts, 133
Albumin in urine, 87, 91, 120–157
Alcoholics, results of treatment in, 32
Alcoholism in parents, 32
in patients, 32
Alimentary canal as port of entry of tuberculosis, 65
disturbance of, 75, 348
Americans versus Europeans, height of, 17
Amyloid casts, 137
of intestine, 349
of kidneys, 362
of liver, 357
of spleen, 369
Anatomy of cervical lymphatics, 186
Ancestral nativity of cases, 6
Annual report, records for, 5
Anthracosis, 340–342
Antibodies in tonsils, 166
Aortic regurgitation, 82, 331, 333
second sound, accentuation of, 83, 84, 88, 127, 148
relation of, to pulse volume, 89
stenosis, 82
Apartment houses in Philadelphia, 39
Appendicitis from tonsillar infection, 183
Appendix, macroscopic and microscopic conditions of, 353
measurement of, 317–320
Appetite, 75
Arteriosclerosis, 82, 84, 85, 89, 149, 335
cause of, 90
Atheroma, 335
Autopsy statistics, 316
Axillary glands, 64, 373

BABINSKI reflex, 242
Bacteriological Report of the Year, 378–389
bacteriology of broncho-caseous pneumonia, 383
of gall-bladder, 389
of kidneys, 385

Bacteriological Report of the Year:
bacteriology of lungs, 382, 388
of pericardium, 389
cultures of organs, how obtained, 378
mixed infection, 384
peritonitis, 389
Bacteriology of blood-streaked sputum, 392
of broncho-caseous pneumonia, 383
of empyema, 389
of gall-bladder, 389
of hemorrhagic cases post-mortem, 394
sputum, 393
of kidneys, 385, 394
of liver, 386, 394
of lungs, 382, 388, 394
of non-hemorrhagic cases post-mortem, 394
sputum, 391
of pericardium, 389
of peritonitis, 389
of pleura, 388
of pyopneumothorax, 388
of spleen, 387
Bedsores, 377
Blackwood, Dr. J. Douglas, Tuberculosis of the Lymphatic Glands and Skin, 224–237
Bladder, 365
Blondes and tuberculosis, 16
Blood, study of, in pulmonary tuberculosis, 108–119
findings, average, according to the stage of disease, 109
in glandular enlargement, 114
in hemoptysis, 114
in intestinal tuberculosis, 114
in pleurisy, 115
in various types of tuberculosis, 116
relation between, and cavity formation, 111
and clinical condition, 116
and various complications, 116
eosinophiles, 117
Bones and Joints, Tuberculosis of, 203–223:
age and, 203–223
cause of, 204
glands, lymphatic, 206
literature on, 223
source of contagion in, 204
Bottle-fed children, 49
Bovine tuberculosis in human beings, 12
Raw's theories on, 66
Bowels, 349
Brain, 238
cortex and emaciation, 247
atrophy of, 247
edema of, 248
Breast-fed children, 49
Bronchi, 340
Bronchial glands, 65, 372
Bronchiectasis, 99, 340, 342
Bronchitis from tonsillar infection, 183
Broncho-caseous pneumonia, 340, 383
Bronchopneumonia, 340
Brunettes and tuberculosis, 16

CADBURY, Dr. Wm. W., Tuberculosis of the Bones and Joints, 203–223
Cardiac disease, 84, 85, 331
Casts in urine, 87, 91, 122–157
Cavity formation, relation between blood-findings and, 111
physical signs of, 290–315
relationship between adherent pleura and, 279
Cecum, 351
chronic hyperplastic tuberculosis of, 352
Census Report, United States, 9
Cerebrum, 238
Cervical glands, 64, 163, 372
lymphatic connection with pleura, 190
relation of supraclavicular to deep, 188
lymphatics, anatomy of, 186
injection of, 189
Children and tuberculosis, 20, 21, 49
bottle-fed, 49
breast-fed, 49
Chills, 80
Choroid plexus, 250
endarteritis of vessels of, 246
Chronicity of tuberculosis, 53
Circulatory disturbances, 87
relation of, to edema, 90
to urinary abnormalities, 90, 148
system, diseases of, 82, 331
Cirrhosis of liver, 357
Clavicle, depression above, 64, 67
significance of depression above, 273, 285
Clinical and Sociological Report of the Year, 5–107:
abdomen, 75, 77
age and implantation of tuberculosis, 20
Cornet on mortality and, 15
of patients, 20
population of Philadelphia according to, 20
relation of, to tuberculosis, 15, 20
aid given to patients, 100
cost of, 103
albumin in urine, 87, 91
alcoholics, results of treatment in, 32
alcoholism in parents, 32

Clinical and Sociological Report of the Year:
alcoholism in patients, 32
alimentary canal as port of entry of tuberculosis, 65
disturbance of, 75
Americans versus Europeans, height of, 17
ancestral nativity of cases, 6
Annual report, records for, 5
aortic second sound, accentuation of, 83, 84, 88
relation of, to pulse volume, 89
apartment houses in Philadelphia, 39
appetite, 75
arteriosclerosis, 82, 84, 85, 89
cause of, 90
axillary glands, 64
blondes and tuberculosis, 16
bottle-fed children, 49
bovine tuberculosis in human beings, 12
Raw's theories on, 66
breast-fed children, 49
bronchial glands, 65
bronchiectasis, 99
brunettes and tuberculosis, 16
cardiac conditions, 82–90
casts in urine, 87, 91
census report, United States, 9
cervical glands, 64
children and tuberculosis, 20, 21, 49
bottle-fed, 49
breast-fed, 49
chills, 80
chronicity of tuberculosis, 53
circulatory disturbances, 87
relation of, to edema, 90
to urinary abnormalities, 90
system, diseases of, 82
clavicles, depression above, 64, 67
clubbed fingers, 54, 56
color of eyes of patients, 16
of patients, 10
complexion and prognosis, 20
mortality according to, 17
of patients, 15, 16
results of treatment according to, 17
complications, 99
constipation, 75
consumptive complexion, 15
eye, 15
contagion, determination of source of, 50, 51
family, 52
from occupation, 50
through consort, 50
through parents, 50

Clinical and Sociological Report of the Year:
Cornet, on mortality by age, 15
cost of dispensary patients, 103
treatment, 104
of inspection of patients, 103
of preventive measure supplies, 103
cough, 98
absence of, 98
cause of, 98
crusade against tuberculosis, results of, 21
curved nails, 54, 55
deathrate, 8, 9
in immigrants from different countries, 8
of natives of foreign parentage, 9
dependents on patients, 43, 46
dextrocardia, 83, 86
cause of, 86
diagnosis of tuberculosis, unreliability of sputum examinations in, 63
diarrhea, 77
diazo reaction, 87
digestive tract, 75, 76
disease arrested, 102, 106
dispensary, 100
treatment, cost of, 104
divorced people in Philadelphia, 14
duration of tuberculosis, 53, 55
dyspnea, 80
earning capacity of patients before illness, 41, 45
during illness, 42, 45
edema, 87, 92
relation of circulatory disturbances to, 90
errors in height, 17
in statistics, 6
Europeans versus Americans, height of, 17
eyes, 15, 16, 69, 93, 95, 107
color of, 16
examinations made, 107
pupils, 93, 95
family and contagion, 52
farm colonies for the tuberculous, feasibility of, 61
females and males in Philadelphia, 13
reason for less frequency of tuberculosis in, 13
proportion of, with tuberculosis, 13
fingers, clubbed, 54, 56
fistula in ano, 99
food, gastric disturbance and, 76
foreign-born patients, 6
people in Philadelphia, 8
foreign countries in which patients were born, 6
parentage, deathrate of people of, 9

Clinical and Sociological Report of the Year:
gastric disturbances and food, 76
gastro-intestinal tract, 75
general appearance of patients, 15, 64, 69
gland, thyroid, 99
glands, axillary, 64
bronchial, 65
cervical, 64
inguinal, 64
mesenteric, 65
heart, 82–92
dilatation of, 82, 90
diseases of, 82
displacement of, 86
murmurs, 83
position of, 83, 85
pulse, 78, 88
rhythm, 84, 85.
size of, 83, 85
Hebrew population of Philadelphia, 12
Hebrews, morbidity in, 12
mortality of, 10
height, errors in, 17
of Americans versus Europeans, 17
of patients, 16
relation of, to tuberculosis, 17
hemorrhage, pulmonary, 92
cause of, 95
hernia, 99
hoarseness, 71
household conditions of patients, 9, 39, 43
sickness in home, 43
houses infected, 50
tenement, 39
human tuberculosis, Raw's theories on, 66
immigrants, 6
burden of, 10
deathrate in, from different countries, 8
implantation of tuberculosis, 20
and age, 20
indoor life and tuberculosis, 13, 31, 41, 44
infected houses, 50
inguinal glands, 64
inspection of patients, 100
cost of, 103
inspectresses, 104
intestines, 60
Jewish hospital, 12
population of Philadelphia, 12
Jews, morbidity of, 10, 12
mortality of, 10
kidneys, albumin in urine, 87, 91
casts in urine, 87, 91
movable, 99
Kosher meat and tuberculosis, 12
Clinical and Sociological Report of the Year:
left-handedness and tuberculosis, 58
leucorrhea, 96
liver, 77
lungs, hemorrhage from, 92
involvement of, 58, 60
primary seat of lesion, 58, 65
lye given as germicide, 103
lymphatic system as primary seat of tuberculosis, 64, 65
maintenance, cost of, 103, 104
males and females in Philadelphia, 13
reason for greater frequency of tuberculosis in, 13
proportion of, with tuberculosis, 13
married patients, 14
people in Philadelphia, 14
medicine, cost of, 103
menstruation, 96
mesenteric glands, 65
milk, amount given to patients, 100
morbidity in Hebrews, 10, 12
mortality according to complexion, 17
at different ages, 15
Cornet on, 15
in Hebrews, 10
in immigrants from different countries, 8
in natives, 9
of foreign parentage, 9
Report, United States Census, 9
nails, curved, 54, 55
native born patients, mortality of, 9
of foreign parentage in Philadelphia, 8
nativity of patients, 6, 7
ancestral, 6
relation of, to tuberculosis, 8
negroes, 10, 20
results of treatment in, 20
nervous examinations made, 107
new cases, 6
night sweats, 92
cause of, 94
non-tuberculous cases, 6
nose and throat examinations made, 107
observance of rules by patients, 100, 104
occupations and tuberculosis, 22–27
in Philadelphia according to United States Census, 22–27
of patients, 22–27, 41
relation of, to tuberculosis, 22–27
old cases, 6
outdoor life and tuberculosis, 13, 31, 41, 44
pain, 92
and pleurisy, 94
cause of, 93

Clinical and Sociological Report of the Year:
parental alcoholism and tuberculosis, 32
parents and contagion, 50
patients, age of, 20
aid given to, 100
cost of 103
alcoholism in, 32
childhood of, 49
color of, 10
eyes of, 16
complexion, 16
dependents on, 43, 46
dispensary, cost of, 103
divorced, 14
earning capacity of, before illness, 41, 45, 61
during illness, 42, 45, 61
foreign-born, 6
general appearance of, 15, 64, 69
health in childhood, 49
height, 16
household conditions of, 9, 39, 43
inspection of, 100
cost of, 103
married, 14
milk given to, amount of, 100
native-born, 6
nativity of, 6, 7
non-tuberculous, 6
number of, 6
observance of rules by, 100, 104
occupations of, 22–27, 41
physical examination of, 5
poverty of, 9, 39, 43
previous diseases of, 47
race of, 11
residence of, 37
change of, 37
results of treatment in, 102
return, 44, 46
sex of, 12
sick benefits of, 43
sickness in the homes of, 43
single, 14
spinal curvature of, 64
unsuitable, 6
wages of, 61
before illness, 41, 45
during illness, 42, 45
weight of, 101, 104
who used tobacco, results of treatment in, 33
widowed, 14
with pulse above and below 100, results of treatment in, 78
with respirations above and below 30, results of treatment in, 79
work of, 41, 44, 45

Clinical and Sociological Report of the Year:
pericarditis, 99
Philadelphia, apartment houses in, 39
foreign-born people in, 8
Hebrew population of, 12
males and females in, 13
native-born of foreign parentage in, 8
population of, 8
occupations in, 22–27
population of, according to age, 20
United States Census Report of, 13
Phipps Hospital, purpose of, 106
phthisical habit, 15, 69
physical examination of patients, 5
pleural effusion, 99
pleurisy and pain, 94
pneumothorax, 99
population of Philadelphia according to age, 20
poverty of patients, 9, 39, 43
prevention of tuberculosis, 106
preventive measure supplies, 100
cost of, 103
previous diseases of patients, 47
primary seat of tuberculosis, 58
prognosis and complexion, 20
and pulse, 78
and respiration, 79
pulmonic second sound, accentuation of, 83, 84, 87
relation of, to pulse tension, 89
pulse, 78–89
above and below 100, results of treatment in patients with, 78
and prognosis, 78
tension, 84, 89
relation of pulmonic second sound to, 89
volume, 84
relation of aortic second sound to, 89
pupils, dilatation of, 93, 95
inequality of, 93, 95
race of patients, 11
relation of, to tuberculosis, 11
Raw's theories on bovine and human tuberculosis, 66
records of cases, how made and preserved, 5
registration of tuberculosis, 9, 38
reproductive organs, 60
residence of patients, 37
change of, 37
resistance to tuberculosis, 9
respiration, 78–82
and prognosis, 79
respirations above and below 30, results of treatment in patients with, 79

Clinical and Sociological Report of the Year:
respiratory tract as port of entry of tuberculosis, 65
results of crusade against tuberculosis, 21
treatment, according to complexion, 17
general, 101–107
in negroes, 20
in patients who used tobacco, 33
with pulse above and below 100, 78
with respirations above and below 30, 79
of alcoholics, 32
return patients, 44, 46
right-handedness and tuberculosis, 58
rules, observance of, by patients, 100, 104
scapular muscle, atrophy of, 53, 57
separated patients, 14
sex of patients, 12
relation of, to tuberculosis, 13
sick benefits of patients, 43
sickness in the home of patients, 43
single patients, 14
people in Philadelphia, 14
skin examinations made, 107
social condition of patients, 14
United States Census Report on, 14
sociological considerations, 5–107
source of contagion, 50
determination of, 51
special examinations made, 107
specific gravity of urine, 87, 91
spinal curvature, 64, 68
spleen, 77
sputum examinations, 61
relation of tubercle bacilli in, to involvement, 63
statistical errors, 6
statistics, scientific, how made and preserved, 5
stomach, 75
sugar in urine, 87
sweats, night, 92
syphilis, 99
temperature, 78
tenement houses, 39
throat, 70
and nose examinations made, 107
thyroid gland, 99
tobacco, 32
results of treatment in patients who used, 33
tongue, 75
tonsils, 70
treatment, dispensary, cost of, 104
Clinical and Sociological Report of the Year:
treatment, results of, according to complexion, 17
general, 102, 104, 106
in alcoholics, 32
in patients who used tobacco, 33
with pulse above and below 100, 78
with respirations above and below 30, 79
tubercle bacilli in sputum, 62
and involvement, 63
United States Census Report, 9
on age, 21
on mortality, 9
on occupation, 22
our discrepancy with, 30
on population in Philadelphia, 13
on social condition, 14
unsuitable cases, 6
urine, albumin in, 87, 91
casts in, 87, 91
diazo reaction in, 87
relation of circulatory disturbances to abnormalities of, 90
specific gravity of, 87, 91
sugar in, 87
valvular heart disease, 82
vascular system, 82
von Behring's theory on source of contagion, 50
wages and tuberculosis, 31, 61
of patients before illness, 41, 45
during illness, 42, 45
weight of patients, 101, 104
gain of, 101
loss of, 101
widowed patients, 14
people in Philadelphia, 14
work and tuberculosis, 31, 41, 44, 50
contagion from, 50
indoor, 31, 41, 44
outdoor, 31, 41, 44
Clinical condition, relation between blood findings and, 116
signs compared with pathological findings, 290–315
of lung cavities, 304
pathological conditions other than cavity formation, 308–314
study of nervous system, 252
Clubbed fingers, 54, 56
Color of eyes of patients, 16
of patients, 10
Colored patients, results of treatment in, 10, 20

Comparison of Results of Cases at the White Haven Sanatorium and the Henry Phipps Institute, 396–402:
reason for better results in advanced cases at Institute than at White Haven Sanatorium, 400
Comparison of the Pathological Findings with the Recorded Clinical Signs in Nine Cases of Tuberculosis of the Lungs, 290–315:
clinical signs of lung cavities, 304
of pathological conditions other than cavity formation, 308–314
Complexion and prognosis, 20
mortality according to, 17
of patients, 15, 16
results of treatment according to, 17
Complications, 99
relation between blood findings and various, 112–116
Constipation, 75, 144
Consumptive complexion, 15
eye, 15
Contagion, determination of source of, 50, 51
family, 52
from occupation, 50
in bone tuberculosis, source of, 204
through consort, 50
through parents, 50
Coördination in tuberculosis, 261
Cornet on mortality by age, 15
Cost of dispensary patients, 103
treatment, 104
inspection of patients, 103
preventive measure supplies, 103
Cough, 98
absence of, 98
cause of, 98
Craig, Dr. Frank A., A Study of the Blood in Pulmonary Tuberculosis, 108–119
Cranial nerves, 264
Crusade against tuberculosis, results of, 21
Cryptogenetic Infections, Importance of the Upper Respiratory Tract in the Etiology of, 163–202:
anatomy of cervical lymphatics, 185
antibodies in tonsils, 166
appendicitis from tonsillar infection, 183
bronchitis from tonsillar infection, 183
cervical glands, 163
lymphatic connection with pleura, 190
relation of supraclavicular to deep, 188
lymphatics, anatomy of, 186
injection of, 189
Cryptogenetic Infections, etc.:
endocarditis from tonsillar infection, 183
etiologic importance of tonsillar infection in pleurisy, 185
expectoration in pulmonary tuberculosis, 168
eye lesions from tonsillar infection, 184
histology of tonsils, 164
Illustrations: Injection of cervical lymph glands and vessels, opposite p. 188
Injection of cervical lymph glands from tonsillar lymph gland, opposite p. 189
injection of cervical lymphatics, 189
jaundice from tonsillar infection, 183
literature on etiology of rheumatism, 199
on lymphatic infection of the pleura, 202
on secondary tuberculosis of the tonsils, 198
on tonsillar absorption, 199
infection, 179–184
on tonsillitis and appendicitis, 202
and bronchitis, 201
and endocarditis, 201
and eye lesions, 202
and general infection, 200
and jaundice, 202
and meningitis, 201
and nephritis, 201
and parotitis, 202
and phlebitis, 201
and pleurisy, 201
and pneumonia, 201
and rheumatism, 199
and skin lesions, 202
and tenosynovitis, 202
lymphatic connection of cervical glands with pleura, 190
of supraclavicular glands with pleura, 197
meningitis from tonsillar infection, 184
nephritis from tonsillar infection, 182
non-tuberculous tonsils in tuberculous cases, 176
parotitis from tonsillar infection, 184
pathological study of supraclavicular lymph glands, 192–195
phlebitis from tonsillar infection, 184
pleura, lymphatic connection with cervical glands, 190
relation of supraclavicular glands to, 187, 197
pleurisy, 163
etiologic importance of tonsillar infection in, 185
from tonsillar infection, 183
pneumonia from tonsillar infection, 183

Cryptogenetic Infections, etc.:
Ravenel's experiments on tonsils, 166
rheumatism from tonsillar infection, 179
skin lesions from tonsillar infection, 184
supraclavicular glands, lymphatic connection with pleura, 197
pathological study of, 192–195
to deep cervical glands, relation of, 188
tenosynovitis from tonsillar infection, 182
tonsils, antibodies in, 166
as gateway for infection, 179–184
cases of secondary tuberculosis of, 169–176
frequency of tuberculosis of, 168
histology of, 164
in non-tuberculous cases, 177
non-tuberculous in tuberculous cases, 176
permeability to bacteria, 185
Ravenel's experiments on, 166
statistics on secondary tuberculosis of, 168
summary of cases of secondary tuberculosis, 177
susceptibility to tuberculosis, 178
Cultures of organs how obtained, 378
Curved nails, 54, 55
Cutaneous tuberculosis, 237
Cyanosis, 324–326

DEATHRATE, 8, 9
in immigrants from different countries, 8
of people of foreign parentage, 9
Delusions, 258
Dementia præcox, 254
Dependents on patients, 43, 46
Depression above clavicle, significance of, 273, 285
Dextrocardia, 83, 86
cause of, 86
Diagnosis of milk spots, 330
of pleural adhesions, 338
of pleurisy, 265
of tuberculosis of lungs, 343
unreliability of sputum examination in, 63
Diaphragm, height of, 328
Diarrhea, 75, 143
Diazo reaction, 87
Digestive tract, 75, 76, 347
Disease arrested, 102, 106
Dispensary, 100
treatment, cost of, 104
Divorced people in Philadelphia, 14
Dreams and sleep, 258
Duration of tuberculosis, 53, 55
Dyspnea, 80

EARNING capacity of patients before illness, 41, 45
during illness, 42, 45
Edema, 87, 90, 92, 127, 147, 324, 326, 340
of brain, 248
of lungs, 340
relation of, to albuminuria, 127, 147
to circulatory disturbances, 90
Emaciation, 321–324
and cerebral cortex, 247
Emphysema, 340–342
Empyema, bacteriology of, 389
Endarteritis of vessels of choroid plexus, 246
Endocarditis, 82, 331
from tonsillar infection, 183
Enteritis, 349
Eosinophiles in pulmonary tuberculosis, 117
Ependyma, 249
Error in pathological report, 378
Errors in height, 17
in statistics, 6
Esophagus, 347
immunity of, 348
Etiologic importance of tonsillar infection in pleurisy, 185
Etiology of bone tuberculosis, 204
of cryptogenetic infections, 163
Europeans, height of Americans versus, 17
Expectoration in pulmonary tuberculosis, 61, 168, 392
Eye lesions from tonsillar infection, 184
Eyes, 15, 16, 69, 93, 95, 107
color of, 16
examinations made, 107
pupils, 93, 95

FALLOPIAN tubes, 367
Family and contagion, 52
Farm colonies for the tuberculous, feasibility of, 61
Females and males in Philadelphia, 13
proportion of, with tuberculosis, 13
reason for less frequency of tuberculosis in, 13
Fingers, clubbed, 54, 56
Fistula in ano, 99, 355
Flick, Dr. Lawrence F., Clinical and Sociological Report of the Year, 5–107
Food, gastric disturbance and, 75, 76
Foreign countries in which patients were born, 6
parentage, deathrate of people of, 9
Foreign-born patients, 6
people in Philadelphia, 8

Foundation of Training School for Nurses, 403

GALL-BLADDER, bacteriology of, 389
Gangrene of lung, 342
of trachea, 347
Gastric disturbances and food, 75, 76
urinary abnormalities, 144
Gastritis, 348
Gastro-intestinal tract, 75, 347
General appearance of patients, 15, 64, 69
Genital organs, 60, 366
Gland, thymus, 377
thyroid, 99, 376
physiology of, 255
Glands, axillary, 64, 373
bronchial, 65, 372
cervical, 64, 163, 372
inguinal, 64, 372
lymphatic, 64, 206, 224, 372
and skin, tuberculosis of, 224–237
tuberculosis of, and age, 225
and heredity, 227
and milk infection, 227
mesenteric, 65, 372
Glandular enlargement, blood findings in, 114
tuberculosis as a protection against subsequent pulmonary, 228
Graduates of Training School for Nurses, 404

HALLUCINATIONS, 258
Healed lesions in lungs, 340
Heart, 82–92, 325, 331, 333
dilatation of, 82, 90, 331
displacement of, 86
hypertrophy of, 331
immunity of, 333
microscopic condition of, 332
murmurs, 83
position of, 83, 85
pulse, 78, 88
relation of, to pulmonary tuberculosis, 333
rhythm, 84, 85
size of, 83, 85, 317, 334
valvular disease of, 82, 331
weight and measurement of, 317–320
Hebrew population of Philadelphia, 12
Hebrews, morbidity in, 12
Height, errors in, 17
of Americans versus Europeans, 17
of cases autopsied, 317–320
of patients, 16
relation of, to tuberculosis, 17
Hemorrhage, blood findings in, 114
pulmonary, 92
Hemorrhage, pulmonary, cause of, 95
Relation of the Pneumococcus to, 390–395:
bacteriology of blood-streaked sputum, 392
of hemorrhagic cases post-mortem, 394
sputum, 393
of kidneys, 394
of liver, 394
of lungs, 394
of non-hemorrhagic cases post-mortem, 394
of sputum, 391
Henry Phipps Institute and the White Haven Sanatorium, comparison of results of cases at, 396–402
Heredity and tuberculosis of lymph glands, 227
Hernia, 99
Histology of tonsils, 164
History of pleurisy, significance of, 265
Hoarseness, 71
Household conditions of patients, 9, 39, 43
sickness in home, 43
Houses, infected, 50
tenement, 39
Human tuberculosis, Raw's theories on, 66
Hydrocephalus, internal, 248
Hyperemia, passive, and tuberculosis, 333

ILEUM, 349
Illustrations:
Injection of cervical lymph glands and vessels, opposite p. 188
Injection of cervical lymph glands from the tonsillar lymph gland, opposite p. 189
Productive type of leptomeningitis with localized tubercle formation on arachnoid, opposite p. 240
Immigrants, 6
burden of, 10
deathrate in, from different countries, 8
Immunity of esophagus, 348
of heart, 333
of pancreas, 359
of pericardium, 330
of stomach, 348
Implantation of tuberculosis, 20
and age, 20
Indoor life and tuberculosis, 13, 31, 41, 44
Infected houses, 50
Infection, milk, in lymph gland tuberculosis, 227
Inguinal glands, 64, 372
Injection of cervical lymphatics, 189
Insanity, 254
Inspection of patients, 100

Inspection of patients, cost of, 103
Inspectresses, 104
Interspaces, retraction of, significance of, 274, 278
Intestinal tuberculosis, blood findings in, 114
Intestine, large, 351
small, 349
Intestines, 60, 349, 351
Irwin, Dr. J. Willoughby, Bacteriological Report of the Year, 378–389
Relation of the Pneumococcus to Hemorrhage, 390
Ischiorectal region, 355

JAUNDICE from tonsillar infection, 183
Jejunum, 349
Jewish Hospital, 12
population of Philadelphia, 12
Jews, morbidity of, 10, 12
mortality of, 10

KIDNEYS, 385
albumin in urine, 87, 91
bacteriology of, 385, 394
casts in urine, 87, 91
diagnosis of tuberculosis of, 364
microscopic conditions of, 362
movable, 99
weight and measurement of, 317–320
Kosher meat and tuberculosis, 12

LARGE intestine, 351
Laryngological Work, 158–162:
larynx, form of lesion in, 159
location of lesion in, 158
surgery of, 160
non-tuberculous lesions, 159
nose, 158
throat, 158
Larynx clinically, 158
pathologically, 346
Left-handedness and tuberculosis, 58
Leptomeningitis, 238
chronic, 244
subacute, 243
Leucorrhea, 96
Literature on albumin and casts, 157
on etiology of rheumatism, 199
on lymphatic infection of pleura, 202
on secondary tuberculosis of tonsils, 198
on tonsillar absorption, 199
infection, 179–184
on tonsillitis and appendicitis, 202
and bronchitis, 201
Literature on tonsillitis and endocarditis, 201
and eye lesions, 202
and general infection, 200
and jaundice, 202
and meningitis, 201
and nephritis, 201
and parotitis, 202
and phlebitis, 201
and pleurisy, 201
and pneumonia, 201
and rheumatism, 199
and skin lesions, 202
and tenosynovitis, 202
on tuberculosis of bones and joints, 223
Liver, 77, 356, 386, 394
bacteriology of, 386, 394
microscopic conditions of, 356
weight and measurement of, 317–320
Location of lesion in lymphatic gland tuberculosis, 226
Lungs, bacteriology of, 382, 388, 394
clinical and pathological findings in, 390
edema of, 340
emphysema of, 340–342
eosinophiles in tuberculosis of, 117
gangrene of, 342
healed lesions in, 340
hemorrhage from, 92
involvement of, 58, 60
location of cavities in, 342
primary seat of lesion in, 58, 65
study of blood in tuberculosis of, 108–119
weight and measurement of, 317–320
Lupus vulgaris, 237
Lye given as germicide, 103
Lymphatic connection of cervical glands with pleura, 190
of supraclavicular glands with pleura, 197
glands, 64, 206, 224, 372
tuberculosis of, and age, 225
and heredity, 227
milk infection in, 227
and Skin, Tuberculosis of the, 224–237
age and lymph gland tuberculosis, 225
glandular tuberculosis as a protection against subsequent pulmonary, 228
heredity and tuberculosis of lymph glands, 227
infection by milk in lymph gland tuberculosis, 227
location of glandular lesion, 226
lupus vulgaris, 237

Lymphatic Glands and Skin, Tuberculosis of:
milk infection in lymph gland tuberculosis, 227
relative position of present glandular and present pulmonary lesion, 229
of primary pulmonary and previous glandular lesion, 228
skin tuberculosis, 237
tonsils, 229
system as primary seat of tuberculosis, 65
Lymphatics, anatomy of cervical, 186
injection of cervical, 186

McCarthy, Dr. D. J., Neurological Work, 238–264
Maintenance, cost of, 103, 104
Males and females in Philadelphia, 13
proportion of, with tuberculosis, 13
reason for greater frequency of tuberculosis in, 13
Married patients, 14
people in Philadelphia, 14
Measurement and weight of the body and organs compared with the standard weight of the body for the height and age, 317–320
Medical Staff of the Institute, 4
Medicine, cost of, 103
Memory, 259
Meninges, 238
Meningitis from tonsillar infection, 184
Meningo-encephalitis, chronic tuberculous 244
Menstruation, 96
Mental attitude, 257
Mesenteric glands, 65, 372
Miliary tubercles of the meninges without meningitis, 241
Milk, amount of, given to patients, 100
infection in lymph gland tuberculosis, 227
spots on pericardium, 330
Mitral regurgitation, 331, 333
stenosis, 331, 333
Mixed infection, 243, 384
Montgomery, Dr. C. M., Albumin and Casts in Pulmonary Tuberculosis, 120–157
Morbidity in Hebrews, 10, 12
Mortality according to complexion, 17
at different ages, 15
Cornet on, 15
in Hebrews, 10
Mortality in immigrants from different countries, 8
of natives, 9
of people of foreign parentage, 9
Report, United States Census, 9
Muscular power, 260
Myocarditis, interstitial, 332

Nails, curved, 54, 55
Native-born of foreign parentage in Philadelphia, 8
patients, mortality of, 9
Nativity of patients, 6, 7
ancestral, 6
relation of, to tuberculosis, 8
Negroes, results of treatment in, 10, 20
Nephritis from tonsillar infection, 182
Nervous disease and tuberculosis, 253
examinations made, 107
system, 238
clinical study of, 252
Neurological Work, 238–264:
Babinski reflex, 242
brain, 238
cortex and emaciation, 247
atrophy of, 247
edema of, 248
choroid plexus, 250
endarteritis of vessels of, 246
clinical study of nervous system, 252
coördination in tuberculosis, 261
cranial nerves, 264
delusions, 258
dementia præcox, 254
dreams and sleep, 258
endarteritis of vessels of choroid plexus, 246
ependyma, 249
hallucinations, 258
hydrocephalus, internal, 248
illustration: Productive type of leptomeningitis with localized tubercle formation on arachnoid, opposite p. 240
insanity, 254
leptomeningitis, 238
chronic, 244
subacute, 243
memory, 259
meninges, 238
meningo-encephalitis, chronic tuberculous, 244
mental attitude, 257
miliary tubercles of the meninges without meningitis, 241
mixed infection, 243
muscular power, 260
nervous disease and tuberculosis, 253
system, clinical study of, 252

Neurological Work:
pineal gland, 251
reflexes, 262
retraction of eyelids, 264
sleep and dreams, 258
thyroid gland, physiology of, 255
tremor, 264
vasomotor tone, 264
von Graefe sign, 264
New cases, 6
Night sweats, 92
cause of, 94
Non-tuberculous lesions of throat in tuberculous cases, 159
patients, 6
tonsils in tuberculous cases, 176
Nose and throat, 158
examinations made, 107
Number of cases autopsied, 378
Nylic standard, 316

OBSERVANCE of rules by patients, 100, 104
Occupations and tuberculosis, 22–27
in Philadelphia according to United States Census, 22–27
of patients, 22–27, 41
relation of, to tuberculosis, 22–27
Off, Dr. Henry J., Laryngological Work, 158–162
Old cases, 6
Omentum, 360
Outdoor life and tuberculosis, 13, 31, 41, 44
Ovaries, 367

PAIN, 92
and pleurisy, 94
cause of, 93
significance of, in pleurisy, 266
Pancreas, 317, 358
immunity of, 359
microscopic conditions of, 358
weight and measurement of, 317–320
Parental alcoholism and tuberculosis, 32
Parents and contagion, 50
Parotitis from tonsillar infection, 184
Pathological findings compared with clinical signs, 290–315
Report of the Year, 316–377:
abdomen, 327, 348
abdominal viscera, position of, 327
age of cases autopsied, 317–320
amyloid of intestines, 349
of kidneys, 362
of liver, 357
of spleen, 369
anthracosis, 340–342

Pathological Report of the Year:
appendix, macroscopic and microscopic conditions of, 353
measurement of, 317–320
arteriosclerosis, 335
atheroma, 335
bedsores, 377
bladder, 365
bowels, 349
bronchi, 340
bronchial glands, 372
bronchiectasis, 340, 342
bronchopneumonia, 340–342
cardiac disease, 331
cecum, 351
chronic hyperplastic tuberculosis of, 352
cervical glands, 372
cirrhosis of liver, 357
cyanosis, 324–326
diagnosis of milk spots, 330
of pleural adhesions, 338
of tuberculosis of lungs, 343
diaphragm, height of, 328
digestive tract, 347
edema, 324–326
of lungs, 340
emaciation, 321–324
emphysema, 340–342
enteritis, 349
esophagus, 347
immunity of, 348
Fallopian tubes, 367
fistula in ano, 355
gangrene of lung, 342
gastritis, 348
gastro-intestinal tract, 347
genital organs, 366
gland, thymus, 377
thyroid, 376
glands, bronchial, 372
cervical, 372
inguinal, 372
mesenteric, 372
healed lesions in lungs, 340
heart, 317, 327, 329
dilatation of, 331
hypertrophy of, 331
immunity of, 333
microscopic conditions of, 332
relation of, to pulmonary tuberculosis, 333
size of, 317, 334
valvular disease of, 331
weight and measurement of, 317–320
height of cases autopsied, 317–320
hyperemia, passive, and tuberculosis, 333
ileum, 349

Pathological Report of the Year:
immunity of esophagus, 348
of heart, 333
of pancreas, 359
of pericardium, 330
of stomach, 348
inguinal glands, 372
intestine, large, 351
small, 349
ischiorectal region, 355
jejunum, 349
kidneys, diagnosis of tuberculosis of, 364
microscopic conditions of, 362
weight and measurement of, 317–320
large intestine, 351
larynx, 346
origin of tuberculosis of, 346
liver, microscopic conditions of, 356
weight and measurement of, 317–320
lungs, 317, 339–345
edema of, 340
emphysema of, 340–342
gangrene of, 342
healed lesions in, 340
location of cavities, 342
weight and measurement of, 317–320
lymphatic glands, 372
measurement and weight of the body and organs compared with the standard weight of the body for the height and age, 317–320
mesenteric glands, 372
myocarditis, interstitial, 332
Nylic standard, 316
omentum, 360
ovaries, 367
pancreas, 317, 358
immunity of, 359
microscopic conditions of, 358
weight and measurement of, 317–320
patients, average weight of, 316
highest weight of, 316
normal weight of, 316
pelvic viscera, conditions of, 365
position of, 327
pericardium, 329
immunity of, 330
milk spots on, 330
peritoneum, 360
classification of tuberculosis of, 361
origin of tuberculosis of, 361
pleura, 335–338

Pathological Report of the Year:
pleural adhesions, diagnosis of, 338
location of, 338
effusion, 336, 339
pneumothorax, 335–337
position of body viscera, 327
prostate, 365
pyopneumothorax, 337, 338
pyothorax, 336–338
rectum, 355
respiratory tract, 339
sex of cases autopsied, 317–320
small intestine, 349
spleen, 317, 369
microscopic conditions of, 370
weight and measurement of, 317–320
stomach, 348
immunity of, 348
subcutaneous fat, 321–324
suprarenals, 375
tænia saginata, 350
testicles, 366
thoracic viscera, position of, 327
thymus gland, 377
thyroid gland, 376
tonsils, 374
trachea, 347
uterus, 367
valvular disease, 331
vascular system, 335
viscera, position of body, 327
weight and measurement of the body and organs, 317–320
of patients, average, 316
highest, 316
last before death, 317–320
loss of, 321, 324
Patients, age of, 20
aid given to, 100
cost of, 103
alcoholism in, 32
average weight of, 316
childhood of, 49
color of, 49
of eyes of, 16
complexion of, 16
dependents on, 43, 46
dispensary, cost of, 103
divorced, 14
earning capacity of, before illness, 41, 45, 61
during illness, 42, 45, 61
foreign-born, 6
general appearance of, 15, 64, 69
health of, in childhood, 49
height of, 16
highest weight of, 316
household conditions of, 9, 39, 43
housing of, 39

Patients, inspection of, 100
cost of, 103
married, 14
milk given to, amount of, 100
native-born, 6
nativity of, 6, 7
non-tuberculous, 6
number of, 6
observance of rules by, 100, 104
occupations of, 22–27, 41
physical examination of, 5
poverty of, 9, 39, 43
previous diseases of, 47
race of, 11
residence of, 37
change of, 37
results of treatment in, 102
return, 44, 46
sex of, 12
sick benefits of, 43
sickness in the home of, 43
single, 14
spinal curvature of, 64
unsuitable, 6
wages of, 61
before illness, 41, 45
during illness, 42, 45
Philadelphia, foreign-born population in, 8
Hebrew population of, 12
males and females in, 13
native-born of foreign parentage in, 8
population of, 8
occupations in, 22–27
population of, according to age, 20
United States Census Report of, 13
Phipps Hospital, purpose of, 106
Phlebitis from tonsillar infection, 184
Phthisical habit, 15, 69
Physical examination of patients, 5
Physiology of thyroid gland, 255
Pineal gland, 251
Pleura, 265–289, 335–338, 388
and cavity formation, relationship between adherent, 279
bacteriology of, 388
in Pulmonary Tuberculosis, 265–289:
cavity formation, relationship between adherent pleura and, 279
depression above clavicle, significance of, 273, 285
diagnosis of pleurisy, 265
history of pleurisy, significance of, 265
interspaces, retraction of, significance of, 274–278
normal pleura, 284
pain in pleurisy, significance of, 266
pathology of pleura, 265
pneumothorax, 282
pyopneumothorax, 282
Pleura, lymphatic connection between cervical glands and, 190
relation of supraclavicular glands to, 187, 197
Pleural adhesions, diagnosis of, 338
location of, 338
effusion, 99, 336, 339
Pleurisy, 163, 265, 335
and pain, 94
blood findings in, 115
etiologic importance of tonsillar infection in, 185
from tonsillar infection, 183
pain in, 266
Pneumococcus to Hemorrhage, Relation of, 390–395
Pneumonia from tonsillar infection, 183
Pneumothorax, 99, 282, 335, 337
Population of Philadelphia according to age, 20
Position of body viscera, 327
Poverty of patients, 9, 39, 43
Prevention of Tuberculosis, 106
Preventive measure supplies, 100
cost of, 103
Previous diseases of patients, 47
Primary seat of tuberculosis, 58
Prognosis and alcoholism, 32
and complexion, 20
and pulse, 78
and respiration, 79
and urinary abnormalities, 139, 152
and use of tobacco, 33
Prostate, 365
Pulmonary tuberculosis, a Study of the Blood in, 108–119
eosinophiles in, 117
Pulmonic second sound, accentuation of, 83, 84, 87
relation of, to pulse tension, 89
Pulse, 78–88
above and below 100, results of treatment in patients with, 78
and prognosis, 78
tension, 84, 89
relation of pulmonic second sound to, 89
volume, 84, 89
relation of aortic second sound to, 89
Pupils, dilatation of, 93, 95
inequality of, 93, 95
Pyopneumothorax, 282, 337, 338
bacteriology of, 388
Pyothorax, 336–338

Race of patients, 11
Ravenel's experiments on tonsils, 166

Raw's theories on bovine and human tuberculosis, 66
Records of cases, how made and preserved, 5
Rectum, 355
Reflexes, 262
Registration of tuberculosis, 9, 38
Reproductive organs, 60, 366
Residence of patients, 37
change of, 37, 38
Resistance to tuberculosis, 9
Respiration, 78–82
and prognosis, 79
Respirations above and below 30, results of treatment in patients with, 79
Respiratory tract, 163, 339
as port of entry of tuberculosis, 65
Results of crusade against tuberculosis, 21
of treatment, 398
according to complexion, 17
general, 101–107
in negroes, 20
in patients who used tobacco, 33
with pulse above and below 100, 78
with respirations above and below 30, 79
of alcoholics, 32
Retraction of eyelids, 264
of interspaces on inspiration, significance of, 274, 278
Return patients, 44, 46
Rheumatism from tonsillar infection, 179
Right-handedness and tuberculosis, 58
Rules, observance of, by patients, 100, 104

Scapular muscle, atrophy of, 53, 57
Separated patients, 14
Sex of cases autopsied, 317–320
of patients, 12
relation of, to tuberculosis, 13
to urinary abnormalities, 146
Sick benefits of patients, 43
Sickness in the home of patients, 43
Single patients, 14
people in Philadelphia, 14
Skin examinations made, 107
lesions from tonsillar infection, 184
tuberculosis, 224–237
Sleep and dreams, 258
Small intestine, 349
Social condition of patients, 14
United States Census Report on, 14
Sociological considerations, 5–107, 403
Source of contagion, 50
determination of, 51
Special examinations, 107
Specific gravity of urine, 87, 91, 150
Spinal curvature, 64, 68
Spleen, 77, 317, 369, 387
bacteriology of, 387
microscopic conditions of, 370
weight and measurement of, 317–320
Sputum, bacteriology of blood-streaked, 392
of hemorrhagic, 393
of non-hemorrhagic, 391
examinations, 61
relation of tubercle bacilli in, to involvement, 63
Stage of disease, average blood-findings according to, 109
Stanton, Dr. Wm. B., The Pleura in Pulmonary Tuberculosis, 265–289
Statistical errors, 6
Statistics, scientific, how made and preserved, 5
Stomach, 75, 348
immunity of, 348
Subcutaneous fat, 321–324
Sugar in urine, 87
Suprarenals, 375
Sweats, night, 92
Syphilis, 99

Tænia saginata, 350
Temperature, 78
Tenement houses, 39
Tenosynovitis from tonsillar infection, 182
Testicles, 366
Thoracic viscera, position of, 327
Throat, 70, 158
and nose, examinations made, 107
Thymus gland, 377
Thyroid gland, 99, 376
physiology of, 255
Tobacco, 32
results of treatment in patients who used, 33
Tongue, 75
Tonsillar infection causing appendicitis, 183
bronchitis, 183
endocarditis, 183
eye lesions, 184
general septicemia, 181
jaundice, 183
meningitis, 184
nephritis, 182
parotitis, 184
phlebitis, 184
pneumonia, 183
rheumatism, 179
skin lesions, 184
tenosynovitis, 182
Tonsils, 70, 229, 374
antibodies in, 166
as a gateway for infection, 179–184
cases of secondary tuberculosis of, 169–176

Tonsils, frequency of tuberculosis in, 168
histology of, 164
in non-tuberculous cases, 177
non-tuberculous in tuberculous cases, 176
permeability to bacteria, 185
Ravenel's experiments on, 166
statistics on secondary tuberculosis of, 168
summary of cases of secondary tuberculosis, 177
susceptibility to tuberculosis, 178
Trachea, 347
Training School for Nurses of the Henry Phipps Institute: 403–404
Treatment, dispensary, cost of, 104
results of, according to complexion, 17
general, 102, 104, 106
in alcoholics, 32
in patients who used tobacco, 33
with pulse above and below 100, 78
with respirations above and below 30, 79
Tremor, 264
Tubercle bacilli in sputum, 62
and involvement, 63
and urinary abnormalities, 150
Tuberculosis of the bones and joints, 203–223
of the skin, 237
Tumor albus, 203

UNITED STATES Census Report, 9
on age, 21
on mortality, 9
on occupation, 22
our discrepancy with, 30
on population in Philadelphia, 13
on social condition, 14
Unsuitable cases, 8
Upper respiratory tract, 346
in etiology of infections, 163
Urinary abnormalities and age, 145
and arteriosclerosis, 149
and gastric disturbances, 144
and intestinal involvement, 140, 143
and prognosis, 139, 152
and sex, 146
Urine, albumin in, 87, 91, 120–157
casts in, 87, 91, 120–157
diazo reaction in, 87
relation of circulatory disturbances to abnormalities of, 90, 127, 148
specific gravity of, 87, 91, 150
Urine, sugar in, 87
tests for albumin in, 120
tubercle bacilli in, 150
Uterus, 367

VALVULAR heart disease, 82, 331
Vascular system, 82, 335
Vasomotor tone, 264
Viscera, position of body, 327
Von Behring's theory on source of contagion, 50
Von Graefe sign, 264

WAGES and tuberculosis, 31, 61
of patients before illness, 41, 45
during illness, 42, 45
Walsh, Dr. Joseph, Comparison of Results of Cases at the White Haven Sanatorium and the Henry Phipps Institute, 396–402
Comparison of the Pathological Findings with the Recorded Clinical Signs in Nine Cases of Tuberculosis of the Lungs, 290–315
Relation of the Pneumococcus to Hemorrhage, 390–395
Weight and measurement of the body and organs, 317–320
of patients, 101, 104
average, 316
gain of, 101
highest, 317
last before death, 317–320
loss of, 101, 321–324
White, Dr. C. Y., Pathological Report of the Year: 316–377
White Haven Sanatorium and the Henry Phipps Institute, comparison of results of cases at, 396–402
swelling, 203
Widowed patients, 14
people in Philadelphia, 14
Wood, Dr. George Bacon, The Importance of the Upper Respiratory Tract in the Etiology of Cryptogenetic Infections, Especially in Relation to Pleuritis, 163–202
Training School for Nurses of the Henry Phipps Institute, 403–404
Work and tuberculosis, 31, 41, 44, 50
contagion from, 50
indoor, 31, 41, 44
outdoor, 31, 41, 44

This book should be returned to the Library on or before the last date stamped below.

A fine of five cents a day is incurred by retaining it beyond the specified time.

Please return promptly.